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School Board Journal

A PERIODICAL OF SCHOOL ADMINISTRATION

VOLUME 104, NUMBER 1

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JANUARY, 1942

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SCHOOLHOUSE CONSTRUCTION IN WAR PERIODS

Before the last World War there had been a steady rise in the number of schoolhouses erected annually and in the educational and structural quality of these new buildings. The advent of the war had a disastrous effect upon new schoolhousing in the United States. The number of building projects was sharply cut and on the whole the war-time structures were hardly adequate for even the most needed essentials. It took nearly ten years following the armistice to catch up on the most troublesome needs which the inactivity of the years 1917 to 1919 created.

It seems likely at this time that history will repeat itself in that a decline in general construction enterprises will set in. A "shelf" of school-building needs will develop. It remains true, however, that in localities where the school population is increasing and in instances where old structures have reached a stage of obsolescence new schoolhouses MUST be provided. Growing children cannot wait — they must have healthful, safe, and educationally effective housing, and competent instruction — all without interruption.

The American people are alive to the fact that its schools MUST go on if democracy is to live and the nation is to survive. An efficient school implies adequate housing, namely such housing as will enable the supervisory and instructional corps to carry on a broad program of education. It implies, too, that the housing will make easy a wide variety of activities that will overcome harmful emotional and health strains due to war conditions and will permit of happy living for all children during a large portion of the day. It further implies that the supplies and equipment with which every school must be provided must not fail even during the stress and sorrow of war.

The school administrator and the school-board member recognize clearly the situation that confronts them. They will practice every economy consistent with high standards of efficiency and will make the school dollar go as far as they can make it go.

THE EDITOR

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The contents of this issue are listed in the "Education Index."

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THE AMERICAN
School Board Journal

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Building for the Small Elementary School

Frank O. Evans[1]

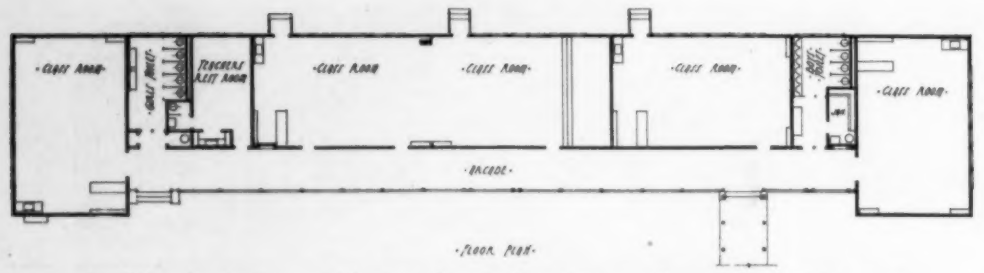
Planning for school construction has become more difficult in recent years because of the decentralization of population and the declining birth rate. It has been necessary to plan for smaller schools or at least to consider the possibility that any school may remain small. When a first building was erected 10 or 15 years ago it was considered merely a beginning, to be followed by a second and possibly a third unit as the school increased in size. In many cases the expected growth has failed to appear and the school plant has been left badly out of balance. Certain facilities were planned to meet the needs of a large school, while others were entirely omitted with the expectation of including them in subsequent buildings. Since it has now become evident that many schools will remain small, it is wiser to plan a complete housing program for a small enrollment rather than to look forward to growth which may not occur.

The demand for small elementary school plants has led to many interesting educational and architectural developments. One of the first attempts in southern California to break away from traditional compact construction was made in Santa Monica in the construction of the Roosevelt School. The plans of this schoolhouse follow very closely the ideas of classroom teachers and probably more nearly resemble a natural home atmosphere as to terraces and gardens than any other school that has been built in this section. The amount of outside space available to supplement the classrooms is unusually large, a feature which would hardly be possible in larger schools. The liberal provision for outdoor assemblies and activities seem to take the place of an auditorium and space has been allowed for future construction. While many other small schools with excellent features have since been erected, the Roosevelt School still embodies practically all of the good points of the new type of construction.

For the purposes of this discussion, a small school will be defined as one having an enrollment of 275 or 300 pupils, calling for seven classrooms and a kindergarten. To provide for a complete program, some provisions should be made for an auditorium or assembly room and, possibly, a cafeteria or lunchroom. Offices, service rooms, and toilets must necessarily be included, but should be held to a minimum of space. Since the school is small, it seems obvious that no special rooms can be included and that each classroom must be adaptable to a wide variety

[1]Head Supervisor, Educational Housing Section, Los Angeles City Schools.

The Roosevelt School, Santa Monica, California, takes full advantage of the possibilities of landscaping and forms a true beauty spot in a beautiful residential community. — Marsh, Smith & Powell, Architects, Los Angeles.



Double classrooms with an elevated stage at the end of one room solve the problem of assemblies in small schools.

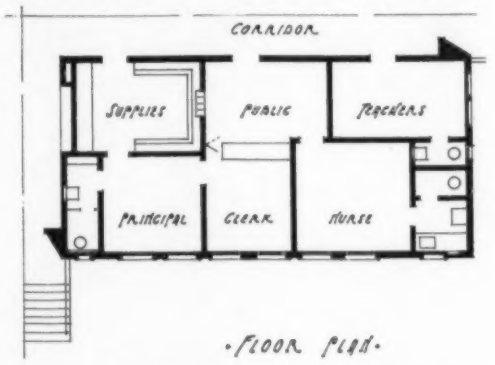
of uses. For this reason, the adequacy of any small plant will be judged largely by its classrooms.

The Classroom

While the old standards called for 15 sq. ft. per child, modern requirements call for from 20 to 30 sq. ft. per child with provision for a maximum of 40 children per room. Since a modern classroom may be in turn a workroom, a laboratory, and a little theater, flexibility is of prime importance. Flexibility is secured by avoiding partitions, obstructions, cubbyholes, and the many other impediments of the older rooms. It is the objective in planning the modern classroom to leave the space as free and unobstructed as possible. The growing demand for doors opening to a court or garden represents an attempt to achieve more flexibility by bringing the yard and garden into the field of instructional use. The more flexible school unit has a good chance of avoiding obsolence, for it can be adapted to changing needs and activities. Many details distinguish the modern classroom from the older type of room which was designed to accommodate the maximum number of pupils who were chiefly engaged in study and formal recitation. Not only is more space required, but attention must be given to acoustics. If one group is engaged in construction while another is looking up references, there must be a minimum of echo or reverberation. Hence, the floors are covered with linoleum or mastic and the ceiling is treated with sound-absorbing materials. Painting and modeling call for the installation of a sink, and the wide range of creative activities demands ample provision for display on bulletin boards, exhibit cases, and broad window ledges. The general effect of such a room more closely approaches that of the child's home than it does the old formal recitation room. Thus, the child comes into a familiar and natural atmosphere where he can continue his usual activities with freedom and ease.

The modern classroom must provide for both individual freedom and group activity. The workbench, the reading alcove, and the garden plot offer a chance for the child to work as an individual. Greater opportunity for such work can be offered if all equipment is movable. Workbenches and easels should be usable either in the room or outside. Movable bookcases permit change of location of the reading alcove to accommodate other activities. Dramatic play and music should be possible either in the room or the patio, and gardening takes on significance if the garden plot is a corner of the patio and not a distant corner of the school grounds.

In recent years attention has been focused on the distribution of light in an effort to secure uniformity in all parts of the room, rather than a high intensity of illumination. By the use of indirect lighting, fixed louvers, and other artificial aids, it has proved possible to approximate absolute uniformity throughout the room, but this is likely to be at the



The office and administrative unit, Loma Vista School, Bell, California.

expense of good ventilation and of the advantages of direct sunlight. In view of these disadvantages it does not seem to be worth while to incur the expense necessary to secure such a degree of uniformity. Better lighting fixtures arranged so that only the needed lights are used, tilted ceilings, and Venetian blinds seem to provide a sufficient degree of uniformity of illumination. The wide range of activities and the rapid change from one thing to another found in the modern program tends to minimize the importance of absolute uniformity in lighting.

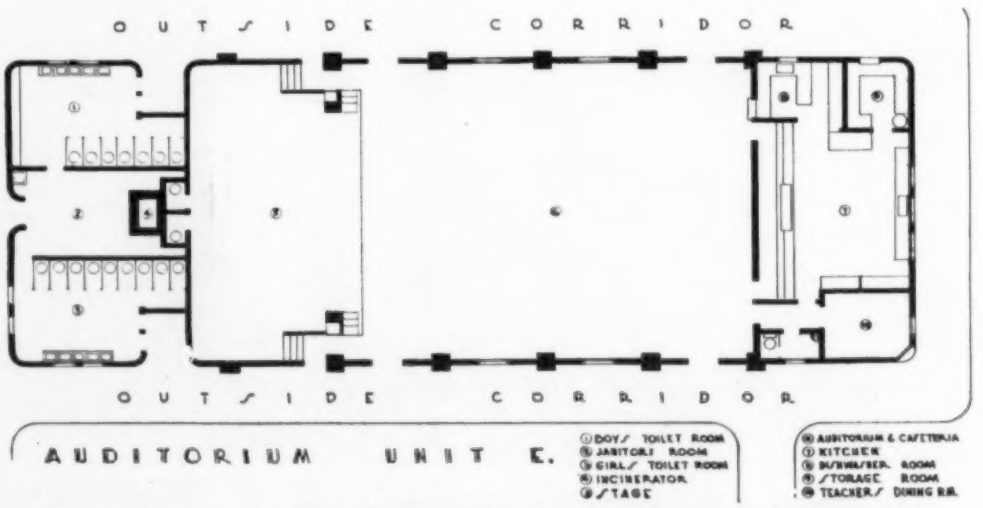
The Office and Administrative Rooms

The office requirements of a small school present a difficult problem. In a larger school, space equivalent to one and one half or two classroom units is allocated to office, supply room, teachers' room, and working space for the nurse on her occasional visits. To duplicate the standard office layout of large schools in so small a building is expensive and in excess of actual needs. On the other hand, it seems difficult to omit any one unit or to make satisfactory combinations. In a small building of eight or ten units, one unit should be enough for office and related services. Attempts to solve the problem by combining teachers' room and nurse's room have proved unsatisfactory, but in a few instances it has been found practical to use a single room for principal and clerk, holding the nurse's room in reserve for occasional conferences of a private nature.

Of the various attempts to plan an office suitable for the small school, the best results have been obtained at the Loma Vista School. In this case, without any double use, all necessary units are provided in a space 23 by 42 ft., or slightly more than the standard classroom unit. The only essential point in which this plan deviates from accepted standards is in that it does not provide 20 ft. for the eye test, but this can be arranged by use of a mirror or by placing the chart in the general waiting room and giving the test through the open door. One advantage in this compact arrangement lies in the fact that the nurse's room, which often stands empty, can readily be used to supplement the general office. Other office layouts have been made in space equal to one classroom, proving that a larger space is not essential.

The Auditorium Problem

There is an increasing demand for auditoriums even in the smaller schools, both as a part of the educational program and as a means of community interest and support. Usually the first decision in regard to the auditorium relates to the question of having a separate auditorium or one which is com-



The auditorium unit of the Potrero School is complete and self-contained and serves adequately as a cafeteria.

bined with some other unit. Since combinations are seldom satisfactory, it is always better to construct a separate unit, if funds permit.

If a separate auditorium is out of the question, several combinations are possible. The combination most frequently found is the auditorium which consists of a double classroom. In this combination it is possible to get a reasonable amount of space, but usually in a room which is poorly shaped for assembly purposes. The disturbance which is necessary to convert it into an auditorium is a decided limitation upon the amount of use.

A much more practical combination is found in the kindergarten auditorium, particularly in schools where the kindergarten children are in attendance for only one half of the day. The absence of fixed seating and the larger space usually found in the kindergarten offer excellent possibilities for use as an assembly room. It is possible, also, to afford a larger space for the kindergarten if the room is put to double use.

A less frequent combination is that of the auditorium and cafeteria, which works out well from the standpoint of time and use. In such combinations the kitchen is found in the rear, leaving the larger part of the building for assembly room and dining room. The chief objections to this combination in a small school are the large amount of storage space required for the two kinds of equipment and the fact that it is questionable whether a small school can profitably support a cafeteria.

The Cafeteria

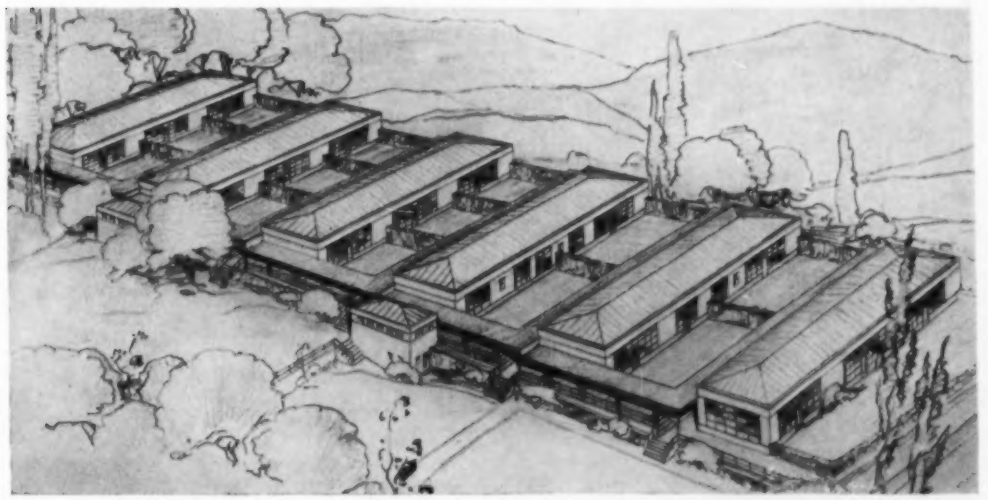
Under average conditions it has been found that a school with an enrollment of 300 cannot support a cafeteria. A minimum number of students for a profitable cafeteria is approximately 150, and it is usually found that not more than one half of the school are patrons. In some communities, however, because of the economic status of the parents or the distance between school and home, even in the small school plant, plans for the cafeteria must be included. To justify such an expense, this unit must be housed in an inexpensive building or be combined with some other facility. The only practical combination seems to be that of the auditorium and cafeteria, which has been developed rather completely at the Potrero School in El Monte. This plant includes an auditorium with a seating capacity of 350 or 400 with a rather complete kitchen and teachers' dining room at the rear. At the lunch period the auditorium is equipped as a dining room. When in use as an auditorium, tables are stacked and the chairs are arranged for auditorium seating. The chief objections to this arrangement are the amount of space necessary for storage and the labor of continually changing from one arrangement to the other. If a small school for which a permanent building is to be erected has been housed in temporary buildings, an inexpensive way of providing for cafeteria or lunchroom is found in leaving one of such temporary buildings on the site and equipping it for cafeteria purposes.

Air view of the Ivanhoe School, Los Angeles, California. The open court plan takes utmost advantage of favorable weather conditions for outside study.

Combining Units Into an Appropriate Group

It is the possibility of working out a plot plan or layout particularly suited to the community and site which makes the small school plant a most interesting problem. In building a large school, there is generally little choice if the necessary units are to be provided in a given space, but with the small school conservation of space is less important and the possibilities of new departures are increased to a corresponding degree. In mild climates the most frequent outcome of this greater freedom is found in the outside corridor and single tier of classrooms.

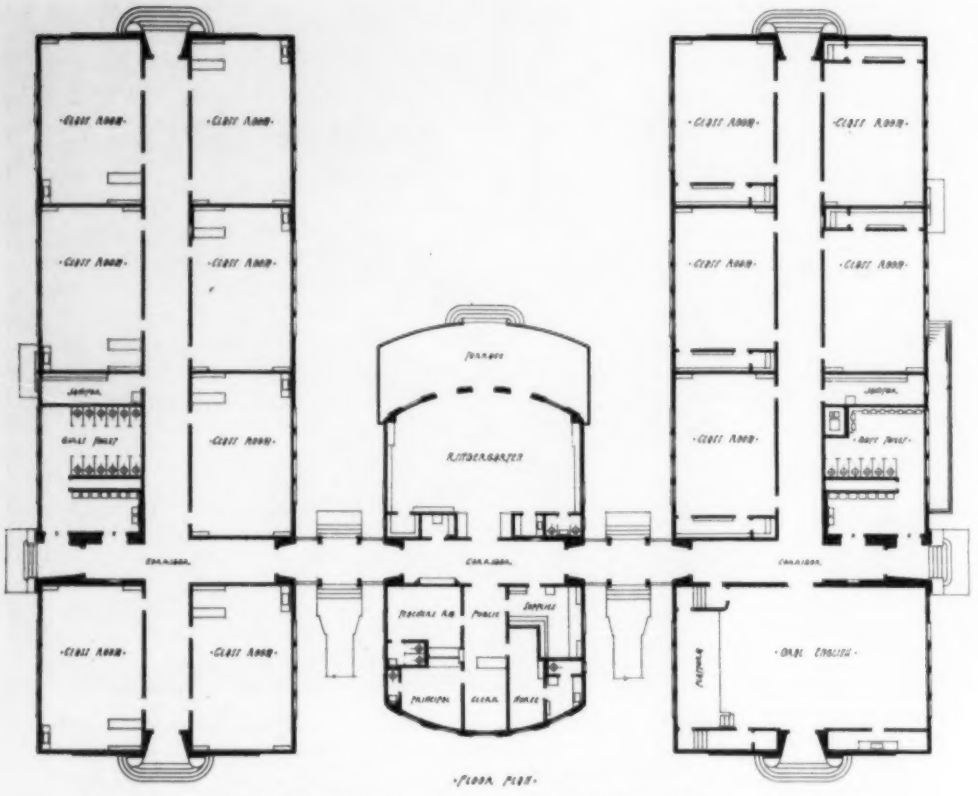
Although in the very nature of the case, the standardization and regularity of pattern are to be avoided, successful small school layouts fall into several general types of classifications. Most popular of all is the hollow square which may either be complete or left open at some point for future expansion. For the hillside site, terraces add too much attractiveness to be ignored, while on the small site where space must be conserved, the L-shaped building is of great advantage. One of the most interesting recent departures is found in the radial layout in which buildings are arranged around a semicircular arcade. Illustrations of successful attempts to find arrangements suited to particular needs are found in the following sections.



The Pinewood School, Tujunga, Los Angeles, California, consists of a series of classroom units connected by open air corridors and served by an administrative office and service units containing toilets, storerooms, janitor rooms, etc.

The Ivanhoe School

The Ivanhoe School building consists of seven classrooms, an auditorium, and an office, all arranged around an enclosed court. The classrooms are in a single tier and each has one door opening on the court and one



Main floor plan of the Menlo Avenue School, Los Angeles, California.

on the outside. The court is 36 ft. wide and 128 ft. long, with approximately half planted in grass and the other half paved for use for outside assemblies. The outside corridors make it possible to pass from any part of the building to any other part without exposure to weather. The auditorium has a seating capacity of 275 and with the office forms the front of the square. The kindergarten is to the rear of the court and is somewhat smaller than the standard, but adequate to the needs of the school. This plant is considered one of the best of the recent small buildings, but is subject to criticism in the amount of space used for purposes other than instruction. In view of the size of the school the office needs could be met in a considerably smaller space.

Credit for both the general plan and detail should be given to Elwin P. Norberg, assistant architect for the Los Angeles board of education.

Pinewood School

Pinewood School is located on a hillside. The available space for the building was not large, and this difficulty was met by building five units, each on an independent terrace. There are three classrooms in each unit, and every classroom has a southern exposure, which means that all day the sun shines into the rooms. Also, each room opens, with wide French doors, into a patio, where the children carry on much of the activity work. There are few days during the school year when these patios cannot be used comfortably. The workbenches and easels are out-of-doors, and tables for clay work, etc., may be moved from classroom as needs arise. Other uses are found for the patio in folk dancing, corrective exercises — in fact, these patios practically double the capacity of the classrooms, because many of the children work in the rooms while others are outside, under close supervision of the teachers.

Menlo Avenue School

The Menlo Avenue School has a capacity of approximately 450 pupils, which is somewhat large to be called a small school, but the same plan could easily be adapted for a smaller enrollment. This plan has been one of the most satisfactory for schools of this size. The plant consists of two small structures with inside corridors connected by an oval-shaped unit which provides space for the office and kindergarten. The only criticism of this plant is that the kindergarten yard lies between the classroom buildings. The best feature is the auditorium which represents the space of two classrooms and a corridor at the end of one classroom building. In this way auditorium seating capacity of 260 is obtained without greater expense than the corresponding number of square feet of classroom area. The space used as an auditorium is approximately 40 by 60 ft., and in an area of this size there appears to be no need for a sloping floor.

Gravois Avenue School

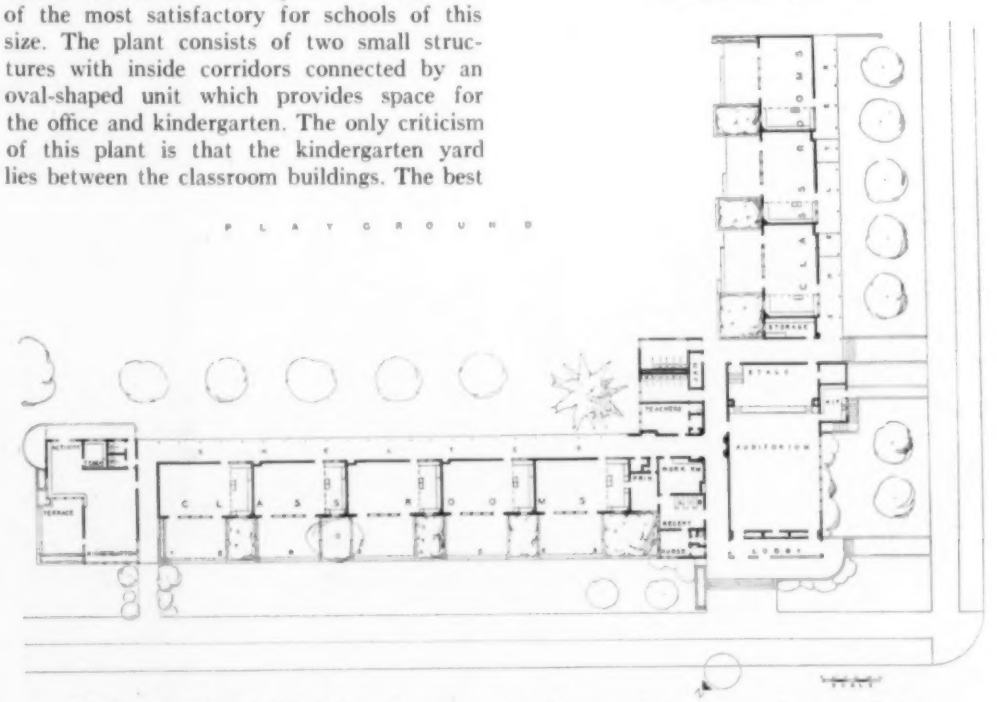
The Gravois Avenue School building does not represent a complete school plant, but it shows some features not found in other buildings. It consists of five classroom units connected with an outside corridor, with the rooms at the end turned at right angles with the axis of the building. Two of these units are separated with folding doors to permit use as an assembly room. The school has an enrollment of approximately 220, occupying three temporary classroom units. The offices are also housed in temporary quarters. When complete, the plant will include a second building similar to the first, providing an office, a kindergarten, and three classrooms. Since the second building will follow the same plan reversed, the final layout will resemble a pair of brackets with a partially enclosed court.

McKinley School, Redlands, California

This school was built on a site somewhat limited in extent, which explains the closeness to the street fronts — to conserve the playground. The school, which is complete except for a cafeteria, is in a well-built neighborhood where the cafeteria is not in demand.

The administrative department is approximately a classroom and a half for the principal, who teaches. The auditorium has a

(Concluded on page 76)



McKinley School in Redlands represents the maximum use of a small site. By keeping the classrooms adjacent to the street the maximum amount of space is available for playground. — Marsh, Smith & Powell, Architects, Los Angeles, California.

Location, Construction, and Equipment of Schoolhouses for Health[1]

T. C. Holy

Within recent years attention has been focused on the influence which the school plant has in determining the kind of education offered. Frequently a board of education may offer a certain subject because space is available, or fail to offer it because space is not available. Recently a school superintendent was in my office talking about his program for the coming year. He said he was faced with two alternatives: either to make substantial changes in his building, or in the curriculum which he hoped to offer. I inquired which of those he meant to change. He answered, "Curriculum — because that is the easier of the two." Also, within the past decade the expenditures necessary to provide the school plant for the public schools of the United States has likewise been stressed. It has been found that the annual expenditures for constructing, equipping, operating, and maintaining the public school buildings in the United States amounts to one third of the total expenditures for public education.[2] In actual dollars, this means that taxpayers of the country contribute approximately $620,000,000 annually to provide plant facilities for the education of their children.

On the other hand, that the importance of the school plant in relation to health has long been recognized is shown by the following quotation taken from the journal of Samuel Lewis, Ohio's first State Superintendent of Common Schools, back in 1838, or more than a hundred years ago:

> The ground on which the (school) house is built should be high, airy, dry, removed from marshes, and stagnant water, not too near much traveled highways; yet having convenient access to it from every direction.
>
> In towns and cities, a lot should be selected, perhaps in the outskirts of the plat, certainly an open, airy situation, affording unobstructed light and air on all sides. This is much more necessary than is commonly supposed. If the house is dark, and ill ventilated, the children may be expected to be dull, and careless, and disorderly, and probably unhealthy. These rules should be carefully observed, at any pecuniary expense.[3]

Location and Building Sites

An analysis of the literature in this field over the past century would show numerous comments similar to the one just quoted; however, only within recent years has much been done about the problem of the location of school buildings in relation to the health of the children. Within the past half century state departments of health throughout the country have been empowered by legislative action to control those factors of location which affect sanitation and thereby affect the health of the children. For example, in Ohio the state department is given broad jurisdiction by law to control these factors. As evidence of this authority, the following quotation from Section 1240 is inserted here:

> No city, village, county, public institution, corporation, or officer or employee thereof or other person shall provide or install a water supply or sewerage, or purification or treatment works for water supply or sewage disposal, or make a change in any water supply, waterworks intake, water purification works, sewerage or sewage treatment works until the plans therefor have been submitted to and approved by the state department of health.[4]

In carrying out the broad implications of this authority, the state department of health has set up a large number of standards which must be met by all schools and other public buildings. Take, for example, the matter of water supply. This standard includes, among other things, the following:

> A well must be located at least 300 feet distant from the nearest existing or possible sources of contamination.[5]

Other states have similar provisions. Thus, by law, society protects the health of the children by requiring adequate sanitary provisions.

Another problem which is becoming increasingly important is that of locating the building so that the fewest number of children will have to cross dangerous thoroughfares. In the case of elementary buildings in particular it is extremely important that careful consideration be given to this problem. Many cities now attempt to reduce this hazard by assigning policemen to dangerous traffic crossings during the time children are going to and from school, while others have been quite successful in organizing school patrols, who serve the same purpose. Also, it is important to locate school buildings away from noises, odors, and other conditions which disturb the work of the school and probably influence the health of the children.

Another problem of location has to do with the orientation of the building with reference to the light in the classrooms. It has been generally agreed that the majority of classrooms should face approximately east or west, thus avoiding the direct rays of the sun from the south on the one hand, and the absence of sunlight where the classrooms face the north.

As a part of the problem of location is that of providing adequate recreation space. The importance of this was brought to the foreground by the results of the physical examinations of men called into the army during the World War. In a compilation of the results of these examinations it was found that 2,753,922 men included in this compilation, 468 out of every 1000 had physical defects of some character.[6] Needless to say, these figures showing the physical condition of the young men of the country caused widespread discussion and concern. Organizations such as the American Legion became interested in the problem and sought, along with other civic and professional organizations, to prevent a recurrence of this situation. As a result of these combined activities, 36 states passed laws requiring physical education to be offered in the public schools. One of those was Ohio, which now requires 100 minutes of physical education per school week. Obviously, to carry out these provisions has required much larger school sites. Securing these often results in an entirely different location than would otherwise be the case. Because of this factor, high schools which were located in the downtown sections are now found in the suburban areas where large tracts for recreation are available at a reasonable cost. Personally, I am much interested to see what effect these concentrated efforts on health and physical education over the past 20 years have had on the physical condition of the men now being inducted into military service.

Construction of Buildings

From the health angle, the problem of safety becomes uppermost in the construction of new school buildings. In this city, for example, on March 4, 1908, occurred the Collinwood school fire in which 173 pupils and 2 teachers lost their lives. Growing out of that catastrophe there came in 1911 the adoption of a school-building code in Ohio which stresses particularly the problem of safety. This tragedy, together with others which have occurred from time to time, has resulted in similar legislation in other states. Another example is California where following the earthquake in 1934, legislation requiring school buildings to be constructed as nearly earthquake-proof as possible was enacted. This legislation applied not only to new buildings, but to those already constructed.

Another school disaster occurred in New London, Tex., on March 18, 1937.[7] As a result of this explosion, which almost completely destroyed a building which housed 700 pupils, 294 children and teachers were killed outright, and about 20 others will be maimed for the remainder of their lives. According to the conclusions of the Military Board of Inquiry, this accident resulted from a gas leak which was probably ignited by a spark from a knife switch. As a result of this, the state of Texas at the next meeting of its legislature passed a law which requires that

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[1]This paper was given as a part of the "Symposium on Health Problems in Education" sponsored by the American Medical Association, Cleveland, Ohio, June 3, 1941. The author is Professor of Education at Ohio State University, Columbus.

[2]"School Buildings and Equipment," *American Council on Education Studies*, April, 1939, p. 5.

[3]Holy, T. C., and McKnight, J. A., *Study of Local School Units in Ohio* (Washington, D. C.: U. S. Office of Education, 1937), p. 19.

[4]*A Manual of Water Supply, Sewerage and Sewage Treatment for Public Buildings in Ohio* (Columbus, Ohio: State Department of Health, 1938), p. 3.

[5]*Op. cit.*, p. 6.

[6]Love, Albert G., and Davenport, Charles B., *Defects Found in Drafted Men*. Data compiled from graph records prepared under the direction of Surgeon-General N. W. Ireland. War Department, 1920.

[7]Horn, J. Fred, "The New London, Texas, School Disaster: Its Causes and Legislative Results," *Proceedings*, National Council on Schoolhouse Construction, October, 1937, pp. 93–99.

all gas distributing companies introduce a malodorant in distributing lines. Two other laws — the architects' registration law and the engineers' licensing law — were passed largely as a result of this disaster.

An analysis of school accidents to children while on the school grounds shows that the major causes are falls, cuts from glass and other sharp instruments, and those resulting from handling apparatus or machinery in the building. For example, in a study of accidents occurring in the St. Louis schools, it was found that of 492 such accidents, 205 resulted from falls.[8] In a more recent study by the National Safety Council it was found that the percentage distribution of accidents to the children in the school buildings and grounds were as follows: gymasium, 31 per cent; classrooms, 13 per cent; halls and stairs, 19 per cent; and shops, 12 per cent.[9]

Ventilation and Heating

Another important aspect of the construction of school buildings has to do with the heating and ventilating. As early as 1777, Lavoisier, after studying the effect of air in crowded quarters, attributed it to an excess of carbon dioxide rather than to a lack of oxygen. This theory has been called the carbon-dioxide theory and for more than a hundred years it was regarded as satisfactory. A study of the literature during the nineteenth century shows repeated reference to the significance of heating and ventilating as related to health. For example, in 1854 Henry Barnard proposed that ". . . in every furnace and on every stove a capacious vessel, well supplied with fresh water and protected from the dust, should be placed."[10]

Another interesting comment found in the early literature is that taken from the report of the Superintendent of Public Instruction of the Commonwealth of Pennsylvania for the year ending June 1, 1877. Quoted from that report is this statement: that because of the smoke in the school buildings ". . . the neighbors would sometimes take advantage of this by getting the teachers to smoke their pork and beef for them in the schoolhouse." Of the many studies which have been made in the field of heating and ventilating, the most extensive were those carried on by the New York Commission of Ventilation, which functioned almost continuously from 1913 until its final report in June, 1931. Among its conclusions which have provoked much discussion was the following:

> Desirable conditions may be obtained by at least three methods of ventilation when proper design and operation are provided: (*a*) by plenum ventilation; (*b*) by local unit ventilation; (*c*) by window-gravity ventilation. For the average school, favorably located, window-gravity ventilation seems to be the method of choice on grounds of comfort and of economy.[11]

From the health angle, the incidence of respiratory diseases is assumed to be related to the kind of ventilation. In a study made by Surgeon-General H. S. Cummings of the United States Public Health Service, the incidence of respiratory illnesses is studied in two groups of schools, one ventilated by mechanical means and the other by the natural open-window method. In the group where mechanical ventilation was maintained, absences due to respiratory illness were 3 per cent, while in the group maintaining natural ventilation, these absences were only 1.8 per cent.[12]

Although there has been considerable investigation in the field of heating and ventilation, among the problems still unsolved are the following: the number of cubic feet of air per minute which should be supplied for each pupil; the degree to which air can be safely recirculated; what are the optimum temperatures and humidity conditions for health and safety; and is air-conditioning feasible and economical under typical school conditions. Unfortunately, at present no satisfactory answer can be given to these questions.

Artificial Lighting

Another aspect of construction which is receiving an increasing amount of attention is that of lighting, particularly the artificial type. Here again, as in the field of heating and ventilating, there is no general agreement as to what constitutes optimum lighting conditions, either artificial or natural, or both. In a recent book, Luckiesh and Moss, director and physicist respectively of the General Electric Lighting Research Laboratory at Nela Park, come to the following conclusions regarding the requirements for adequate light:

> 50 to 100 foot-candles for severe and prolonged tasks, such as proofreading, difficult reading, etc.
> 20 to 50 foot-candles for moderately critical and prolonged tasks, such as clerical work, ordinary reading, etc.
> 10 to 20 foot-candles for moderate and prolonged tasks of office and factory and, when not prolonged, ordinary reading, etc.[13]

In 1938 the American Standards Association prepared a revision of its 1932 Minimum Standards which raised this minimum from 5 to 15 foot-candles in classrooms, study halls, lecture rooms, and libraries, and from 8 to 25 in sewing rooms, drafting rooms, and art rooms. This association, which is under the joint sponsorship of the Illuminating Engineering Society and the American Institute of Architects, collaborated in the establishment of these standards with 13 other organizations which included architects, engineers, eyesight specialists, physicians, public health officers, and research workers.[14] This sharp increase in the minimum standards has created considerable discussion and some opposition. For example, the National Council on Schoolhouse Construction at its 1937 meeting passed a resolution urging a further study to ascertain more scientifically optimum lighting requirements.[15] Also, in a carefully prepared paper by Dr. Conrad Berens, chairman of the American Board of Ophthalmology, and surgeon and pathologist in the New York Eye and Ear Infirmary, and Dr. Ross A. McFarland, professor of psychology at Harvard, there appears this statement:

> In our studies in the Harvard Fatigue Laboratory, reading with one foot-candle of illumination as compared with 50 foot-candles apparently had little effect on metabolism and pulse rate when temperature and humidity were controlled.[16]

Growing out of this discussion in the field of lighting have come a number of studies to ascertain the effect which light intensities have on rate of learning. Time permits reference to only one of these, which was carried on in Albany, N. Y., by the New York Power and Light Co. and the Division of Research of the New York State Education Department. Briefly, in this study, two seventh-grade groups of approximately 30 pupils each, equated on the basis of intelligence tests, achievement tests, and chronological age, were housed in two identical classrooms located on the same floor in the same building, and having the same orientation. In one of these rooms, approximately 12 foot-candle intensity was provided, while in the other, 25 foot-candles were provided. During the course of the experiment, which extended over 1½ years, frequent achievement tests were given the two groups to ascertain their rate of learning. In a concluding statement explaining the experiment there is this statement:

> From a study of the results of this experiment, it seems safe to conclude that in this case at least the additional light intensity contributed nothing significant to the educational progress of the experimental group of pupils.[17]

In a study of the lighting in 598 classrooms and laboratories in 52 different school buildings which we are just completing in the Bureau of Educational Research of the Ohio State University, we have found that in 25 of these 52 buildings the average light-meter readings as found upon entrance to these classrooms and laboratories was less than 10 foot-candles. In each of these rooms eight different readings were taken; so the figures on light intensity are the average of those different readings. We also found that in the entire group of classrooms and laboratories the average light-meter reading was 10.9 foot-candles, while the range was from 4 foot-candles to 29 foot-candles.

It seems safe to assume, therefore, that in most classrooms in the United States an appreciable increase could be made of the light intensities and yet still be below the minimum standards as set by the American Standards Association. What effect this poor lighting has on eyesight I am unable to say. However it seems reasonable to assume that it does have an injurious effect. In a recent study of vision in three elementary schools by use of the Snellen Chart, we found one room in which only 3 pupils had 20/20 vision in both eyes.

(Concluded on page 75)

[8] Holy, T. C., "An Analysis of the Causes of St. Louis School Accidents," *School and Society*, August 3, 1929.

[9] *Health Education* (Washington, D. C.: National Education Association, 1941), p. 145.

[10] *Encyclopedia of Educational Research* (New York: Macmillan Co., 1940), p. 1040.

[11] New York Commission on Ventilation, *School Ventilation, Principles and Practices*, Teachers College, 1931.

[12] "The Relation of Respiratory Illness to Ventilation," American School Board Journal, 79:84; July, 1929.

[13] Luckiesh, Matthew, and Moss, F. K., *The Science of Seeing*, Van Nostrand, 1937.

[14] "School Buildings and Equipment," *American Council on Education Studies*, April, 1939, p. 16.

[15] *Proceedings*, National Council on Schoolhouse Construction, October, 1937, p. 13.

[16] "The Eye and Illumination in Schools," *Proceedings*, National Council on Schoolhouse Construction, October, 1940, p. 59.

[17] Wilson, W. K., "An Attempted Measurement of the Relation of Educational Achievement to Artificial Schoolroom Lighting," *Proceedings*, National Council on Schoolhouse Construction, November, 1938, pp. 43–46.

A School Building Program in a Growing City

Frank W. Douma[1]

The city of Ottumwa, Iowa, was originally built on the banks of the Des Moines River. Like most similar towns, the business district and the first residential areas mushroomed out on the flat areas along the river. This resulted in a long, narrow city. The early school authorities, naturally, built their schoolhouses where the population was; as a result, there are eight schoolhouses in Ottumwa, and these stand almost in a straight east and west line.

As the city grew, the population extended up over the bluffs out to the high prairie land, and also to the opposite side of the river. All the new residential sections of the city are growing up at a considerable distance from the original location of the town. The city has developed into a large meatpacking center, and the population growth during the past 20 years has been rapid. An acute school problem accompanied this rise in population. Most of the children lived a considerable distance from the old schools. The board of education and the parent-teacher association decided that the only solution was to erect new schools, which would be so located that the entire population would enjoy easily accessible and modern educational facilities. To solve the immediate problem and quite in harmony with long-range planning considerations, the board of education felt that three schoolhouse projects should be undertaken.

One of the new residential districts on the south side is in the Harding Park Addition. The addition has made especially rapid growth. Since there was no available ground for a schoolhouse in the immediate vicinity, it was decided that the nearest old school building be razed and a new structure take its place. Fortunately the old building is within reasonable distance and easily accessible.

On the north side of Ottumwa where a new residential district is developing, a new building has been located a short distance from the city limits, upon a site that will approximate the population center as the natural growth continues.

In the extreme west end of the city, an entirely new structure was not needed. The plan agreed upon finally called for the remodeling of a soundly built, small building, which with some additions, could be changed into a modern eight-room elementary building.

Financing the Program

This was the program as worked out by the board of education. The city then voted $350,000 in bonds toward the financing of the three projects.

At approximately the same time, the WPA offered to help in the construction of a new athletic field for the high school. An additional bond issue of $18,000 toward the development of the field was voted by the district. With the WPA appropriation the total cost of the field amounted to $52,000. Since that time an additional appropriation has been made and there is still another pending. When the field is finally completed, it will cost between $80,000 and $85,000.

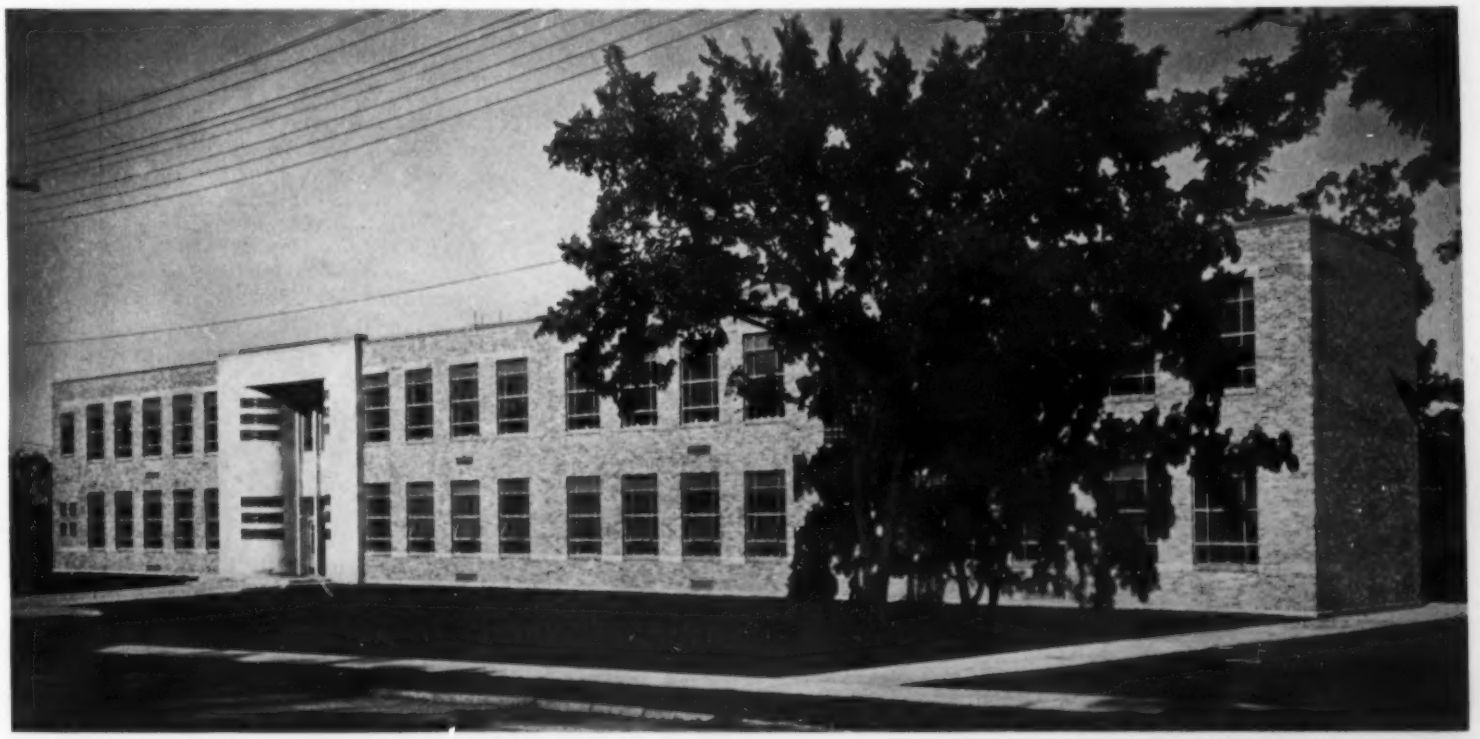
After considerable investigation, the board of education secured the services of Keffer and Jones, school architects, from Des Moines, Iowa. The assistance of Dr. E. T. Peterson, of the Department of Education of the State University of Iowa was also enlisted. These men collaborated with school authorities in studying the local population, economic, social, and educational conditions and made recommendations as to the best sites and best type of buildings for the present needs and the growing educational program. It was decided that a 20-room building should be erected on the south side of the city, a 12-room building on the north side, and an eight-room building in the west end. The building on the south side, named the Agassiz School, has been designed to accommodate 800 pupils. The new Horace Mann School on the north side, has a student capacity of 400. And the west end building, called Fairview, accommodates approximately 250.

Since the general plan and the equipment specifications are approximately the same for all three buildings, attention will be centered on the largest school of the group.

The Agassiz building, built to house 800 pupils, has 18 classrooms, a kindergarten, a library, an auditorium-gymnasium, a kitchen, two locker and shower rooms, a clubroom, and teachers' rest room, besides the customary service rooms such as offices, bookrooms, and storage rooms.

Since the Ottumwa elementary schools are organized on the departmentalized plan, with the special subjects as the basis for the departments, there are a music room, an art room, a science room, and a social-science room. Each of these classrooms is especially planned and has adequate built-in equipment. For instance, the art room has specially built drawing desks, lockers in which each pupil can keep his individual work, storage and display cabinets, and other built-in features especially suitable for an art program.

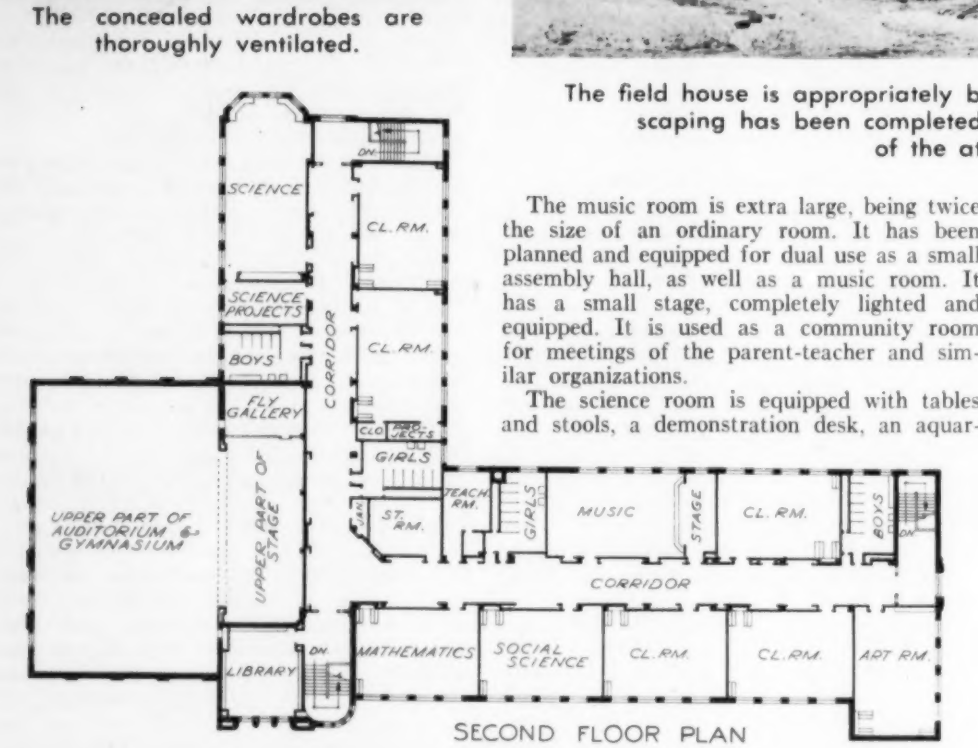
[1]Superintendent of Schools.

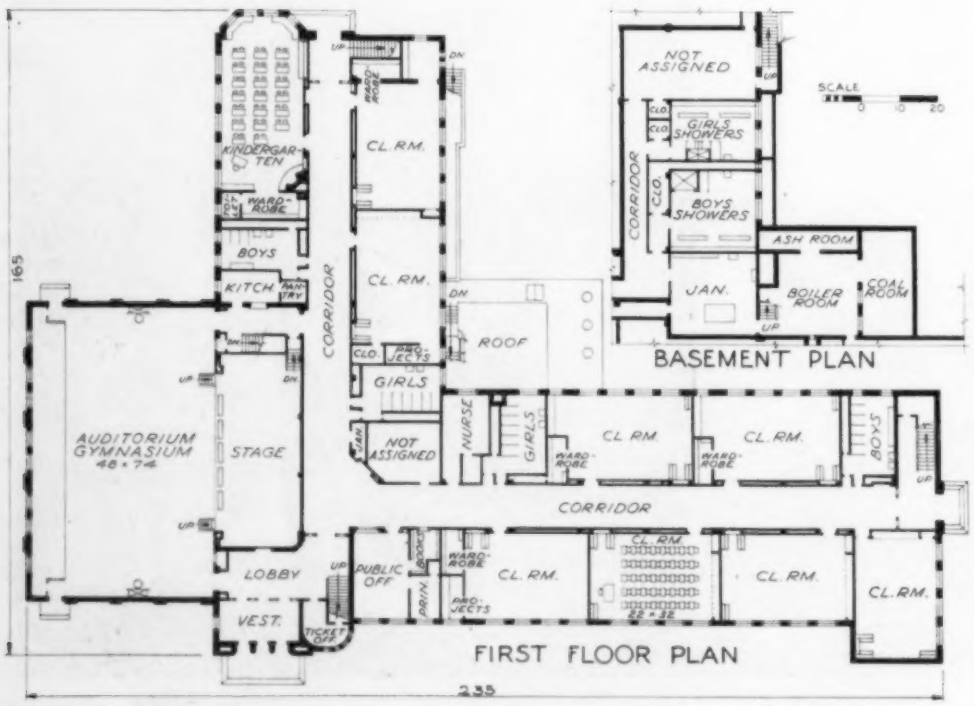


The Horace Mann School, Ottumwa, Iowa, is simple, direct, and honestly expressive of the construction and of the school functions carried on within.

The concealed wardrobes are thoroughly ventilated.

The field house is appropriately built of native stone. When the landscaping has been completed it will be a real beauty spot of the athletic field.





Floor Plans, Agassiz Grade School, Ottumwa, Iowa. — Keffer & Jones, Architects, Des Moines, Iowa.

The music room is extra large, being twice the size of an ordinary room. It has been planned and equipped for dual use as a small assembly hall, as well as a music room. It has a small stage, completely lighted and equipped. It is used as a community room for meetings of the parent-teacher and similar organizations.

The science room is equipped with tables and stools, a demonstration desk, an aquarium, built-in storage cabinets, and seed beds for experimental work with plants of various kinds. In addition, it has a special experimental room where pupils may work on various projects of their own.

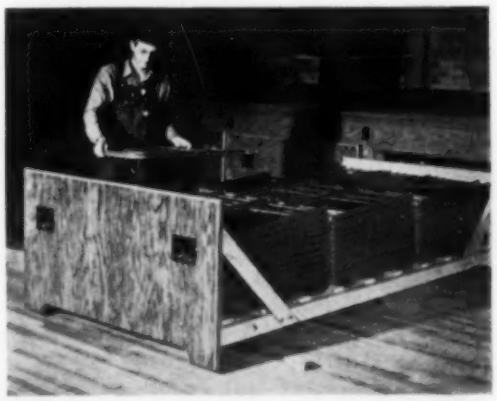
The social-science room is equipped with the latest teaching aids such as maps, globes, bulletin boards, etc. A special project room makes it possible for pupils to work out their social-science projects.

All the corridors and rooms have been acoustically treated in order to eliminate unnecessary noises. There are recessed wardrobes in all the lower grade rooms. In the upper grades, the pupils use individual corridor lockers.

The auditorium-gymnasium, which has a flat, hard maple floor, is 75 ft. long and 48 ft. wide. Although the floor is large enough for regulation basketball games, the room is primarily designed for use as a playroom. The stage is 40 ft. long and 21 ft. deep. For community and school theatricals the stage is equipped with lights, curtains, and cycloramas. The seating capacity of the auditorium is 800.

Project Rooms Provided

Each classroom is equipped with accessories such as cupboards, bookshelves, and book nooks. Practically all of the rooms have adjoining project rooms. These latter are so arranged that the pupils can work on construction projects without disturbing the academic work. All rooms are heated and ven-



The trucks for storing the movable chairs can be rolled to any portion of the auditorium.

The Agassiz school building has been placed at the front of the site where it has the benefit of splendid old elms.

tilated by means of unit ventilators and gravity exhaust flues. An intercommunicating public-address system connects all the rooms with the principal's office. This system is used for radio broadcasts in any or all of the rooms, as well as for recording programs.

The kindergarten has been especially designed for a wide variety of activities. It has a large bay window at one end and is equipped with a fireplace, an inside drinking fountain, and separate toilets.

A feature of the building, which is more or less novel, is the clubroom. Since Ottumwa elementary schools are used during the evening for various club meetings by the Boy Scouts, Girl Scouts, Camp Fire Girls, etc., it was decided that a special room be built in the basement of the school especially for such meetings. The room has an outside entrance and may be used without reference to the rest of the building. It is equipped with cupboards, a toilet, and a drinking fountain, and may be warmed in the winter even when the thermostatic control has reduced the temperature of the classrooms.

The Agassiz Grade School, which cost $160,000, was constructed by the Lansing Construction Co., Ottumwa. Keffer & Jones, of Des Moines, Iowa, rendered the architectural service and supervised the construction.

The Horace Mann School, in the northern section of the city, was erected at a cost of approximately $135,000. It has 10 classrooms, a combined auditorium and gymnasium, and a library. It has been planned to include classes for the first seven grades. It is constructed of brick, hollow tile, and glass brick. An unusual number of large windows provide adequate natural light. The architects for this building were Keffer & Jones; the contractor was Max Mildenstein, of Cedar Rapids, Iowa.

The athletic field is in the shape of a scenic bowl. It includes a regulation playing field and a standard quarter-mile track. Built-in bleachers of stone, which can accommodate 5200 people, flank the two sides of the field. Illumination for night performances is provided by six 70-ft. poles. Ten lights are mounted on each pole, each light having an 1800-watt lamp.

In the field house, erected on the field, there are dressing rooms and shower rooms for both the visiting team and the home team. There is also an equipment room on the main floor. The basement provides dressing rooms for the "B" teams, an equipment room, and a shower room. The entire athletic plant now covers approximately 10 acres. The old football field has been turned over to the ele-

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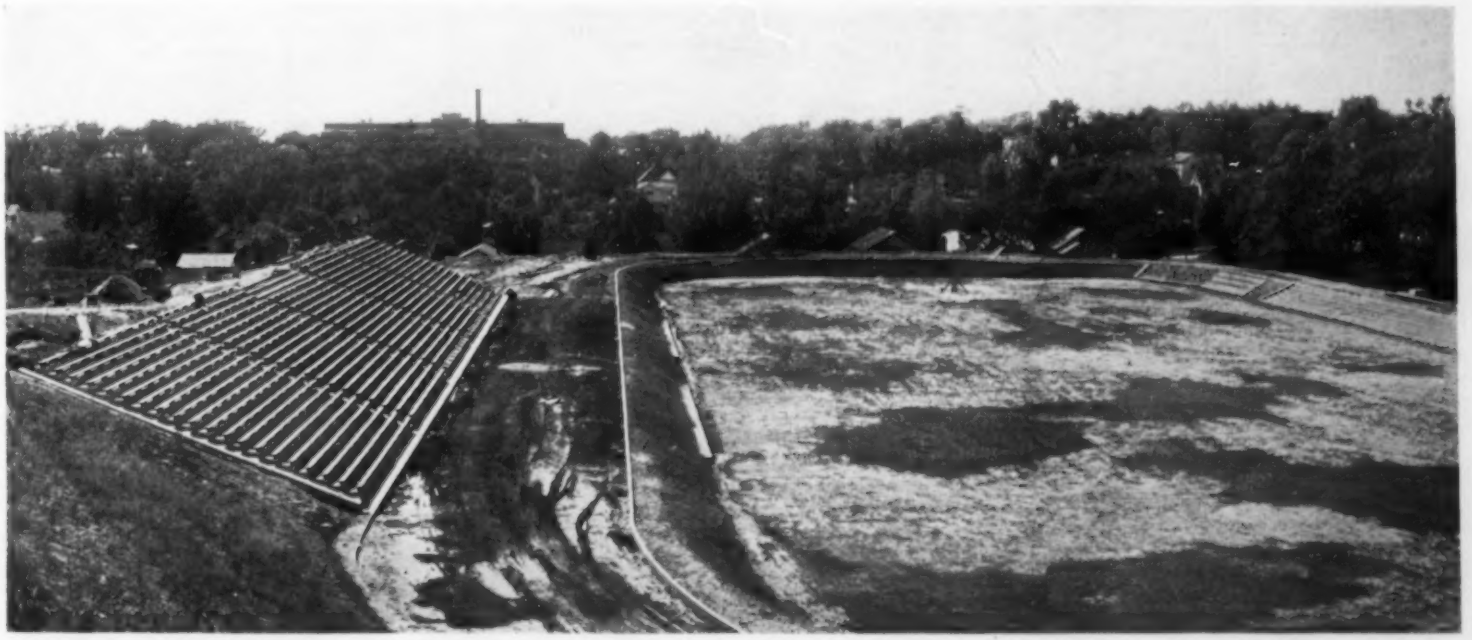
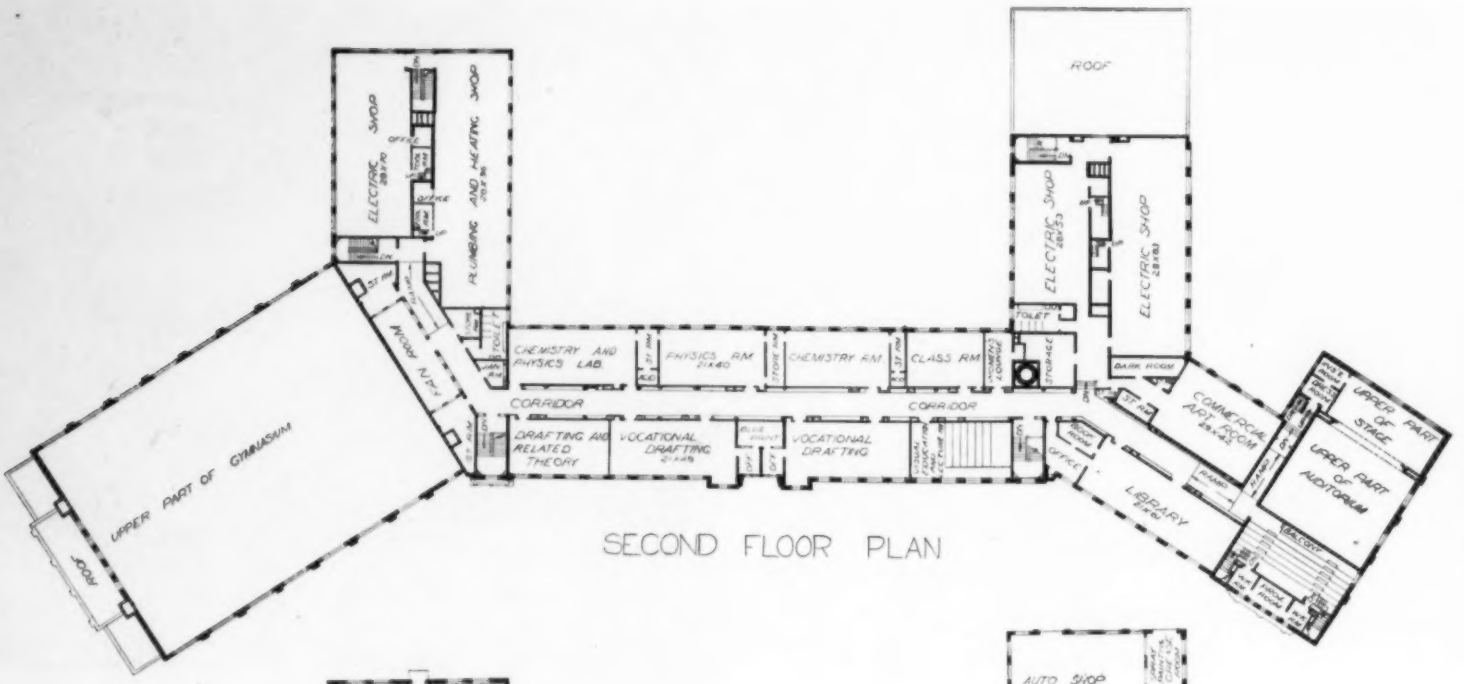
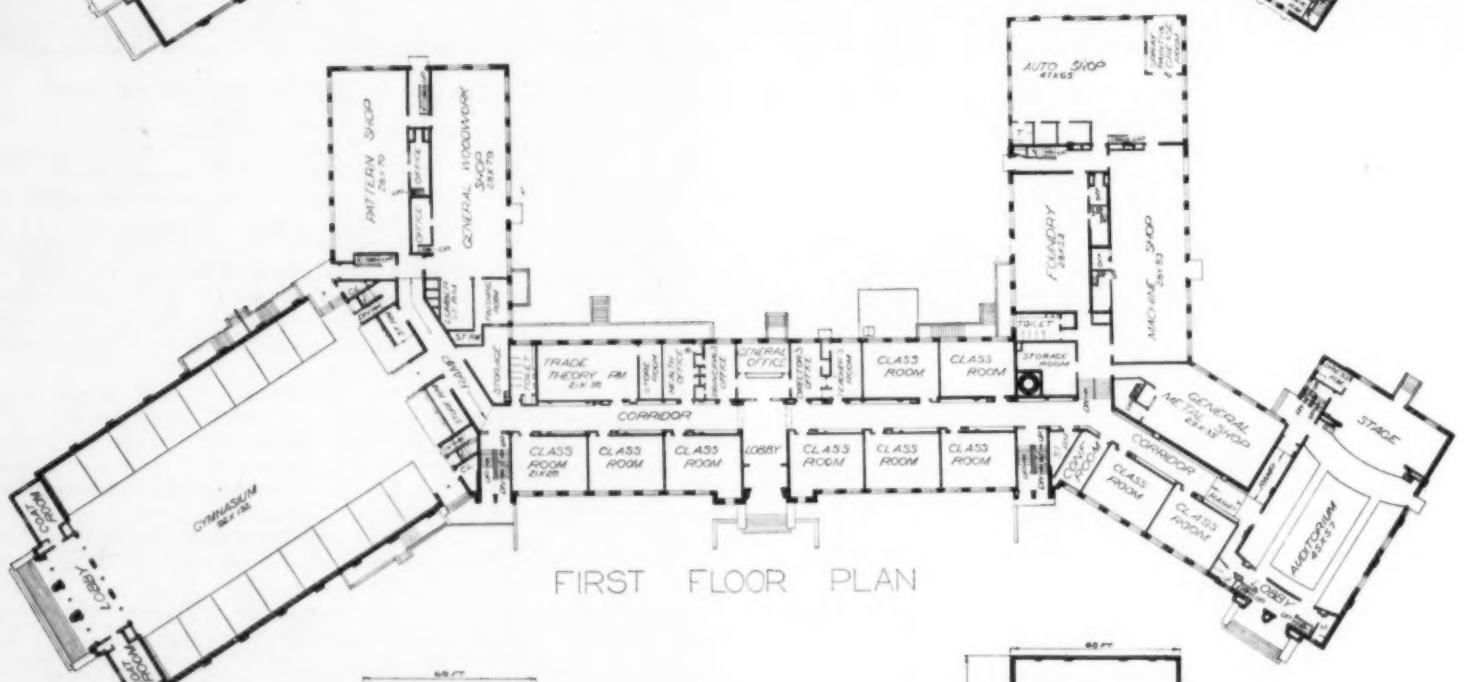
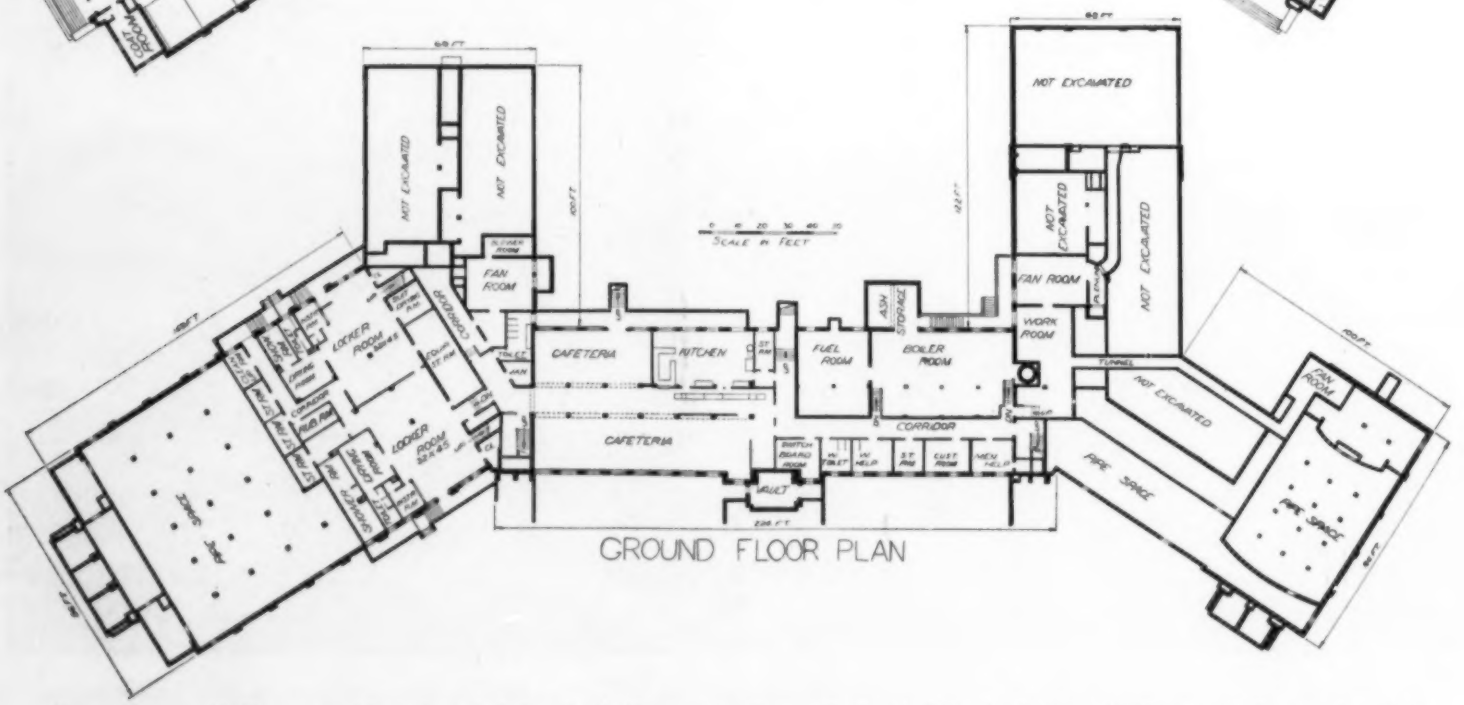


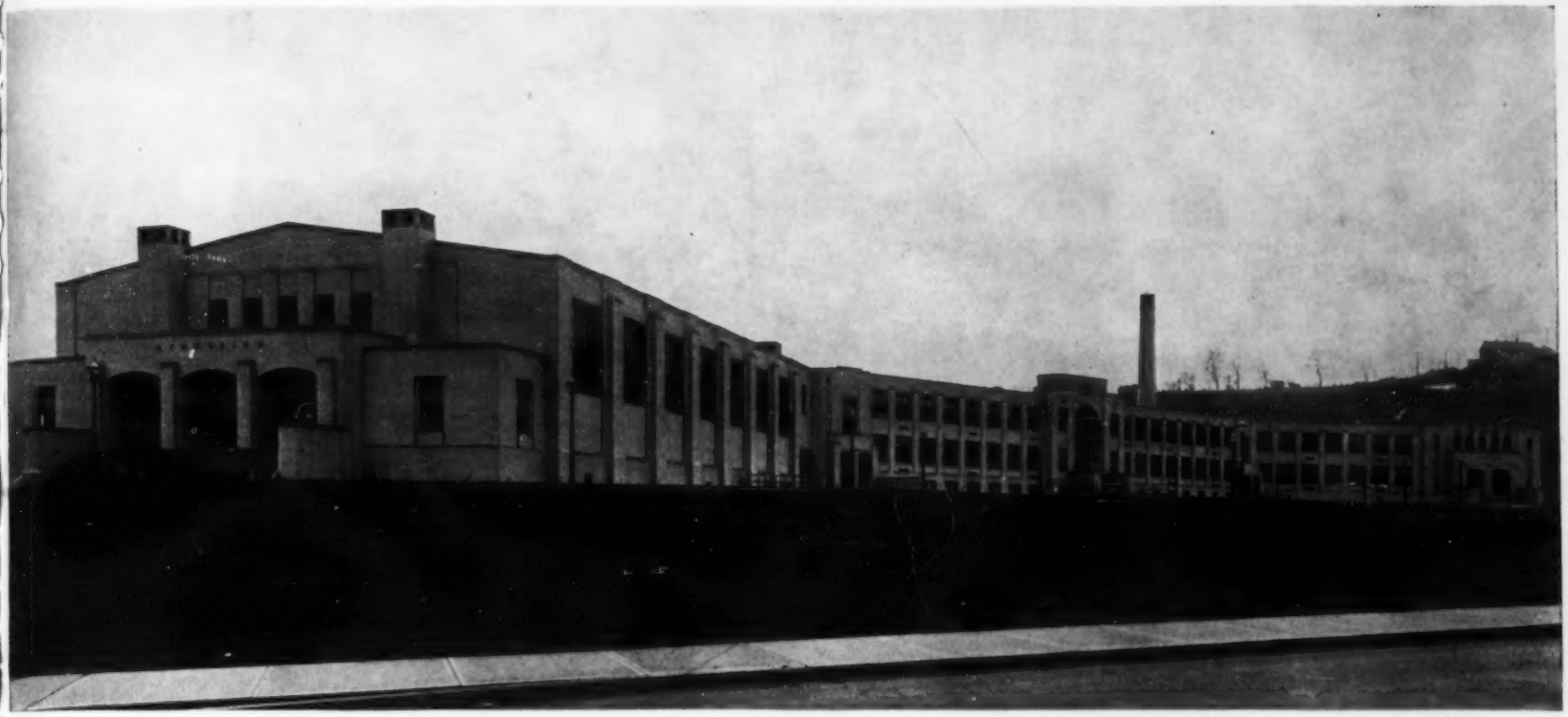
The athletic field makes full use of the natural contour of the site. The rich autumn foliage of the surrounding trees makes it a beauty spot during the fall football season.







Floor Plans, McKeesport Vocational School, McKeesport, Pa. — C. R. Moffitt, Architect, McKeesport, Pennsylvania.



General Exterior, McKeesport Vocational School, McKeesport, Pa. — C. R. Moffitt, Architect, McKeesport, Pennsylvania.

Built to Train for Local Industry

The McKeesport Vocational School

James H. Lawson[1]

The McKeesport Vocational School has been designed and built to provide an effective program of vocational training for the industrial community of McKeesport, Pa., and the adjacent iron and steel manufacturing towns and cities.

Industrial trade courses were introduced in the McKeesport High School in 1921 for the first time, with an initial enrollment of 23 boys in two trade courses: mechanical drawing and patternmaking. A few years later a course in electricity was added to the curriculum. Soon, however, the demands for vocational trade courses were so great that it became necessary to expand the curriculum and the facilities. The school administration cooperated with individual and industrial requests for vocational courses and actively planned shopwork and related academic studies that would serve the widest community and sectional interests.

The present enrollment in the Vocational School is 750 boys, all of whom are tenth-, eleventh-, and twelfth-year students. This is approximately 17 per cent of the total high school enrollment of 4500, and 35 per cent of the male student personnel. In addition there are 350 ninth-year students taking courses to prepare them for the vocational school.

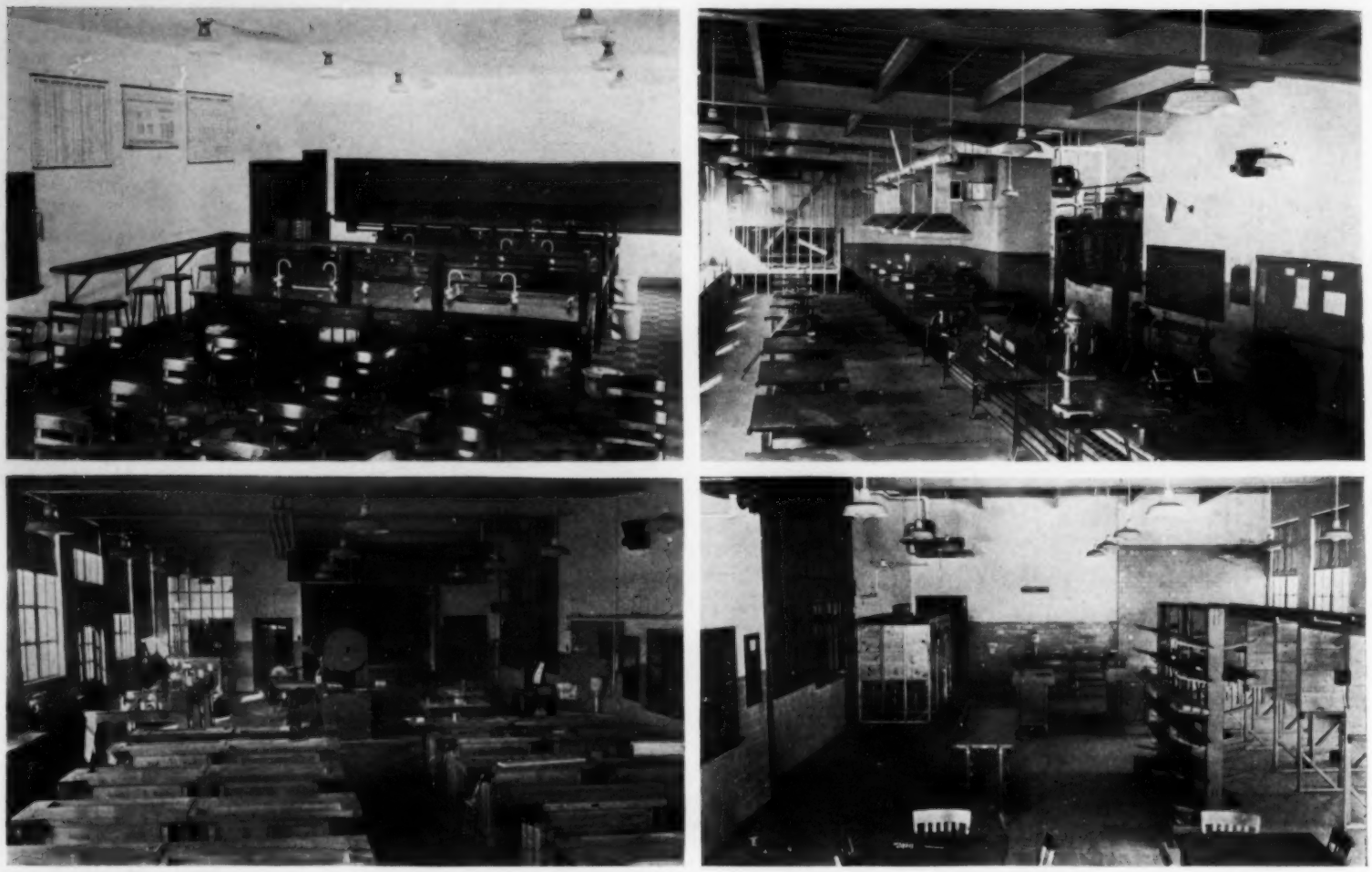
Extensive Shop Facilities Provided

The trade courses offered in the new vocational school are auto mechanics; commercial art; drafting; electricity, including general wiring, radio, household appliances, refrigeration, armature winding, general power installation, servicing and testing, and electrical laboratory; heating and plumbing; general woodworking; patternmaking; and machine shop.

The shop facilities consist of: two machine shops, three electric shops, an electrical theory

The machine shops are fully equipped to provide instruction of utmost utility in industry.

[1]Superintendent of Schools, McKeesport, Pa.



Upper left: the science laboratories are important elements providing theoretical background for the vocational instruction. Upper right: the sheet metal shop is equipped for teaching apprentices in plumbing, heating, and sheet metal working trades. Lower left: the woodshop offers instruction in cabinetmaking, pattern making, and introductory carpentry. Lower right: the electric wiring shop provides experiences in the building and power trades.

room, an auto-mechanics shop, a commercial-art room, a heating and plumbing shop, two trade drafting rooms, a general woodworking shop, a patternmaking shop, a related-drawing room, a trade-theory and visual education room, and a foundry.

All courses are of three-year duration and are conducted on an all-day unit Smith-Hughes basis. Fifty per cent of the time is devoted to practical shopwork; 25 per cent to related mathematics, related science, related drawing, and industrial history; and 25 per cent of the time is devoted to academic subjects including English, economics, etc.

The facilities for the academic and related courses consist of 11 classrooms, one physics lecture room, a chemistry lecture room, a chemistry and physics laboratory, a library, a large gymnasium, and an auditorium.

The school is built on a 49-acre site at the edge of the city of McKeesport. It is a two-story white brick building stretching out along a front 576 ft. It is designed to accommodate some 800 to 900 young American citizens intent upon developing their abilities in vocations of various kinds.

The building faces northwest on the O'Neil Boulevard, and has been set back a distance of 200 ft. to present an imposing picture of modern architecture. It is U shaped, with two additional front wings, the auditorium and the gymnasium which extend forward from both corners of the U at angles of 30 deg. The school includes 13 shops, 11 classrooms, 3 science rooms, a visual education room, trade theory room, library, teacher's rooms, auditorium, gymnasium, cafeteria and kitchen, administrative suite, locker rooms, shower rooms, conference room, custodian quarters, a set of boiler and engine rooms, as well as various storage and utility rooms. The shops vary in size, each having a standard width of

(Concluded on page 78)

The electrical laboratory contains carefully selected modern equipment and machinery to provide experiences which pupils will later duplicate in industry.

Trends in Schoolhousing Design

N. L. Engelhardt, Jr.[1]

School-building planning has passed through three major eras and is apparently embarking upon a fourth. The two centuries elapsing between the construction of the first public school in 1648 and the publication of Henry Barnard's *School Architecture* in 1848 witnessed the development of thousands of buildings crudely but exclusively designed for school purposes. Barnard wrote in the preface of his book:

> Go where I would, in city or country, I encountered the district school-house, standing in disgraceful contrast with every other structure designed for public or domestic use. Its location, construction, furniture, and arrangements, seemed intended to hinder, and not promote, to defeat and not perfect, the work which was to be carried on within and without its walls.[2]

The Second and Third Periods

The influence of such leaders as Barnard and Mann and the newly established state departments of education began a second period to be identified by the improvement in safety, sanitation, and educational facilities. The third movement in the history of schoolhousing was initiated in the early part of the twentieth century and reached its peak during the depression. This period is recognized by the perfection of academic classroom facilities, safety, and sanitation. Even more important than these elements, however, is the change which occurred during this third period in schoolhouse architecture.

In 1874 an English writer, in discussing American schools, stated:

> . . . the architectural character is that of a detached, well-built warehouse.
>
> The architectural designs . . . are extremely plain, not particularly school-like in character, and of no special English interest. . . .[3]

Many of these unattractive dark-brick, two-story buildings still stand in the older sections of our cities. Playrooms or courts, together with toilets, are located in the basements. Classrooms are large but poorly lighted. The old wooden stairs, now largely replaced by fire towers, were serious hazards. Extensive blackboards, fixed seats, and limited equipment suggest the academic recitation type of schooling.

Further from the center of our cities, one can frequently find the early twentieth-century type of structure. The attractive, broken-line design of Ittner's elementary schools and the Gothic pattern of large high schools indicate clearly the first attempts to develop an architectural expression for schools. But much of the design of this period was transmitted from the Teutonic countries. School architecture had not yet expressed the "unique function" of education in American democratic life. This factor in the development of school design is clearly a reflection of the separateness of child education and community life during that era. There was little in the atmosphere or program of the schools which led architects to see the need for a unique design. In fact, the architecture of European cloisters and manors was quite applicable to the American schools of the period. Then, too, the growing communities of the early twentieth century felt the need for erecting large and ornate edifices glorifying the citizens' devotion to education. These school buildings were located on hills, overlooking the neighborhood and clearly visible from the highways. Schools were designed to sell education to the citizens and attract new citizens to the community.

Inside of these monumental structures, education had become a mechanized, curriculum-centered procedure. The lay citizen, as well as some teachers, firmly believed that the young child who followed the factorylike assembly line would come out a well-educated youth. Unfortunately this belief is still existent among many lay members of our communities. In school architecture it has been expressed by the uniformity in pattern from neighborhood to neighborhood, by standardization of plans and façades, and by the likeness of school and factory, especially in the modern architectural designs.

By 1920 school buildings had advanced from the low point of almost complete neglect in the day of Henry Barnard to the high point of monumentalism. They had changed from small shabby, ill-developed units to large massive concrete and brick structures, glorifying education as a process rather than as an integral part of community life.

The Fourth Period

The new trends in school design are being influenced by curriculum research as well as community development. Extensive research has indicated the tremendous impact which environment has on young children. Indications have been found that a great part of a child's personality is relatively fixed by the time he enters school. The learning by doing philosophy is rapidly becoming more meaningful through intensive studies. These findings place added responsibilities on the schools. They point to the need for closer co-ordination of home and school in the educational process. Education cannot be conceived of as mere preparation for adult life. It must be also participation in community life. If such participation is ill-guided then the child will be said to be poorly educated. If it is well guided and the school patterns its program to the impacts of life outside the school, then the child will be better educated.

The implications for such co-ordination and integration of school, home, and community are far reaching. Children and youth must go to school, and so must their parents. An infrequent "guidance" conference is not the solution. The co-ordination must be continuous, and the place of meeting not too frequently the school. Of course, this type of school is not at all necessary for merely learning the "three R's." For that purpose the traditional school building will serve. But the public expects more from all schools today than the "three R's." It expects the school to develop abilities, skills, and attitudes in many fields. These expectations can only be met by the community-centered school, a school designed as an integral part of community living.

The School a Community Institution

Recent developments in community living are also pointing clearly to the need for community-centered schools. Demands for cultural, vocational, and recreational programs for youth and adults are being met in many communities by the lengthening of the school day and the addition of new service units. Community theaters, large general shops, studios for the arts and crafts, playrooms, home arts and nursery units, and informal conference rooms have given added richness to adult community living and the general welfare. Important, too, is the fact that these units in secondary schools have made it possible to add much to the effectiveness of the program for children and youth.

The school as an institution within a community — an institution in a sense of separateness from community life — is rapidly disappearing. Institutionalism may have been quite satisfactory in our economy of the nineteenth century when familism and community enterprise had not begun to decline. Today, however, our schools are being charged with the heavy responsibility of preserving American democracy by acting as a focal point of community welfare. The tremendous increase in adult education, community-wide recreation, and cultural programs has placed the school in a totally new situation. The schoolhouse is a community workshop and should be open many hours during the day for the use of children, youth, and adults.

Community Living in School

The place of the school in today's society is reflected by a changed school architecture. The lay citizen has no concern for monumentalism nor does he want to waste money on school buildings with excessive ornamentation. School buildings are no longer being used to sell communities nor to worship education as an institution. Location on main highways or elevated vantage points has been discarded in favor of sites intimately associated with the homes and neighborhood life. The school must be a place in which democratic living can attain its zenith. It must be an attractive place in which to work,

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[1]Acting Director of Research, Newark, N. J.

[2]Barnard, Henry, *School Architecture* (New York: A. S. Barnes & Co., 1849), p. 6.

[3]Robson, E. R., *School Architecture* (London: Murray, 1874), p. 35.

not at which to gaze. Of course, it must be beautiful — but not too beautiful, because a very beautiful object must be preserved and a school building must be worn out through use. The building must be intimately attractive and not overpowering to small children. It must be a place which children and adults refer to as *our* school.

Throughout the country, school buildings designed to make possible the realization of this type of program are increasing in number. In contrast with the massiveness of the older school there is today the simple campus plan of the community school. The campus plan, calling for small separate units connected by arcades or passageways and attractively grouped in a park setting, has eliminated the institutional atmosphere of the large compact structures. The green grass, spreading trees, and open plan serve to inspire children and adults, creating interest in schooling far beyond anything that the traditional character of schoolhousing could develop. Museums, art galleries, concert and lecture halls, gardens, zoos, water areas, and little theaters are all becoming a part of the new community school. The idea that the community-center building should be separate from the school building is disappearing from the public consciousness. It is realized that the combination offers more adequate facilities for children and adults at lesser cost than could possibly be achieved through separate developments.

Fulcomer studied PWA requests for community buildings aside from schools and found that:

> With the exception of the police court and detention allocation, there is not a single facility indicated in these community building plans that is not a common feature of secondary plants. In fact, such space allocation are those most frequently represented in the plans analyzed. The provision in the secondary school building of these facilities would serve both high school students and adults to advantage, as the discussion of the common nature of many needs of both groups has already indicated. Since most of the requests for PWA funds apparently have been delayed, the growing insistence of real community needs may turn the attention of the community to its own property — the public school buildings. That at the present time many communities still cherish the established tradition of the school as a place for children seems apparent from numerous requests for a community center separate from the secondary school plant structure.[4]

Outdoor School Activities

Another vital element in the changing design of school buildings is in the integration of outdoor activities with the classroom projects. Much natural science can be taught most effectively out-of-doors. Play and recreation are more enjoyable in the woods or in the fields than in the gymnasium. Teachers are finding out that the learning process can be just as effective on terraces as in the classroom and more absorbing. This trend in educational method has required the architect to plan buildings so there is easy access from the indoors to the out-of-doors. Today many classrooms are being constructed with direct entrances to adjacent terraces. This integration of indoor and out-of-door activities has also added weight to the value of the one-story campus plan.

Architect Frank Lloyd Wright in his study of a school building for his model community, Broadacre City, stated:

> The school problem is solved by segregating a group of low buildings in the interior spaces of the city where the children can go without crossing traffic. The school building group includes galleries for loan collections from the museum, a concert and lecture hall, small gardens for the children in small groups and well-lighted cubicles for individual outdoor study; there are a small zoo, large pools, and green playgrounds. This group is at the very center of the model and contains at its center the higher school adapted to the segregation of the students into small groups.[5]

In summarizing the trends in the development of school architecture in recent years it is possible to list several important changes. These changes classify themselves around new materials and methods of construction, new methods of teaching, and changing content of the curriculum. The new construction has created improved exterior and interior treatments with more lighting, more adequate ventilation, better acoustics, and better wearing finishes. The conversion of recitation cubicles into activity spaces and laboratories has brought about the integration of indoor and out-of-door facilities. The changing content of the curriculum has brought about the need for health clinics, little theaters, large general shops, conservatories, museums, and other new units. But beyond these changes there is another major influence which transcends the materials, methods, and content. That influence is the recognition by communities of the potential possibilities of education through democratic participation of all individuals in the program. This influence is breaking down or is belittling monumentalism and institutionalism in favor of the more intimate and more creative atmosphere of the community-centered school. It is to this attitude that one must look for the basic motive which may serve to completely alter the design of school buildings during the next generation.

[4]Fulcomer, Edwin S., *Secondary Schools as Community Centers*, pp. 32–37. American Association for Adult Education, New York, 1940.

[5]Wright, Frank Lloyd, "A New Community Plan," p. 254, *Architectural Record*, April, 1935.

The Development of Public School Grounds

Ernest O. Fox[1]

For our purpose, I wish to consider that the entire area surrounding the school building consists of but one unit, made up of closely related parts, each of which must be properly developed and co-ordinated with the others.

The planning and development of school grounds rightly belong to the field of the landscape architect who is especially trained. The work does not necessarily have to be done by a professional man, for, in the final analysis, a successful development is but the outgrowth of good judgment, intelligent planning, and practical experience.

Bearing in mind the saying, "What would be fair must first be fit," I wish to emphasize the planning of school grounds from the utilitarian standpoint rather than from the aesthetic.

Every school ground may be divided into three parts which, for convenience and want of better terms, may be designated as the "approach areas," the "living areas," and the "service areas."

The portion of the grounds which serves as a setting for the building and which is usually developed from a decorative standpoint, also functioning as a welcome to those using and visiting the school, may rightly be designated the "approach area."

That portion of the grounds used in connection with the main business of the school — education — and which forms a part of the equipment used by the staff of the school for instructional work, may be termed the "living area."

All portions of the grounds used for facilitating the physical operation of the school, may be termed "service areas."

Favorable Impressions Easily Created

First impressions are lasting and a progressive and alert school system strives to make them as pleasing and permanent as possible. If a building is located a reasonable and practical distance from the public sidewalks, if the building elevation conforms to its surroundings, neither appearing depressed on the site nor built on a pedestal, a favorable impression is created. If the building elevation itself is harmonious with the environment and seems to "belong," this also adds to the satisfactory first impression. On the other hand, if the building is so close to the public thoroughfare that one passes it before realizing what it is, or if it is so far removed it seems quite a journey to reach it, then an unfavorable impression is created. This same unfavorable impression is given when a building "type" does not conform to the environment, as in the case of a building of the French Chalet type of architecture surrounded by industrial buildings; or a building with elevations extremely plain and harsh placed in a fine residential neighborbood. All of these things can be controlled when proper foresight and planning are exercised.

A good impression is always made through

[1]Divisional Director, Department of Building and Grounds, Board of Education, Detroit, Mich.

a well-studied arrangement, supplemented by lawns, plant materials, and sidewalk facilities. Well-graded, justifiable lawn areas and the proper planting of shrubs, trees, vines, and other plant materials, together with adequate care and maintenance of these areas, will do much to create favorable impressions. Shrubbery plantings need not be extensive and should not be of the type which require excessive maintenance. Hardy and indigenous plants which are relatively free from fungus disease and insect attack are numerous, not expensive, and by their judicious use an adequate and satisfactory landscape treatment may be secured.

Sidewalks fall logically within the "approach area." Many such areas are ruined by the improper placing and arrangement of sidewalks. Usually the most direct route to the building entrance is the best, which means that these walks are usually straight. A curved walk or one which aimlessly wanders for no reason except the desire of the planner to do something different, is foolish and provides an unpleasant note. Not only is such a walk poor planning, but it also causes maintenance problems. Human beings are prone to follow the lines of least resistance and, if a few steps can be saved by cutting across the lawn, it becomes very difficult to prevent an unsightly path from appearing across such lawn areas. In many cases, curved walks are necessary, perhaps to pass around a large existing tree, to overcome existing peculiarities of grades, or to connect with a street intersection which may be the focal point of a large amount of traffic. In these cases, where a utilitarian purpose governs the design, such a walk arrangement exhibits good planning and produces many pleasing effects.

For this entire "approach area," nothing can be of more benefit than a good job of housekeeping. If this area is littered with rubbish, such as wastepaper, branches of trees or stones, if the lawns are not neatly and uniformly cut, if the trimming immediately adjacent to the building, sidewalks, and the shrub beds is done carelessly or not done at all, then the entire effect of the "approach area" has been damaged. The reaction of those using the school for any purpose whatever is neutral, if not actually negative. So much for this portion of the school grounds.

Planning the Playground

Without a doubt the largest and most important portion of the school grounds falling within the boundaries of the "living area" is the playground. Much has been said and written about the school playgrounds.

From the standpoint of location, it is very desirable to have the playground immediately adjacent to the school building and quite properly in the rear or, if absolutely necessary, at the side. This location will be governed by site limitations and building plans. In any event, building entrances should be provided to make it possible for the children to go directly from the playground into the school without passing around on the public sidewalks to a front entrance. This not only saves time but is a safety measure and allows more careful supervision over the children at a time when they are excited and more or less irresponsible, because of their play activities. If it is impossible for a child to run into the street, obviously the chance of accidents happening there are nil.

Every precaution should be taken for the safety of those using the playground. The very fact that this open area exists is an invitation for the children and others in the vicinity to congregate and to carry on play activities, and school authorities in providing these areas are inviting their use by the public. For that reason, I believe every playground should be surrounded by an adequate fence to prevent those who use the play area from running into the street or into any service area of the school. Usually a wire fence, 6 or 7 ft. high, of the chain-link, diamond-mesh type, is the most desirable both from the standpoint of utility and permanence.

Openings or gates should be provided in this fence, but their location requires close study. For example, an exit from a playground which allows children to pass from the playground to a street intersection is much more dangerous than an exit placed 50 ft. from the corner. The exits, likewise, should be so arranged that a large group of youngsters cannot rush out from the playground at one time. This may be done by narrowing the opening or by placing in front of the opening and approximately 3 ft. back, a short stretch of fence. This arrangement will make it necessary for children to slow down before emerging from the playground onto the public sidewalk or street. Signs which urge caution, placed above the openings, have also been helpful in reducing accidents near playgrounds.

In size, the playground should suit the need of the particular group it is to serve and should be planned according to the type of organization carried on in the school. Obviously, play areas which have to serve an elementary group will be totally inadequate for a junior or senior high school because of the different types of activities carried on at these schools.

Size and Surfacing of Play Areas

For an elementary school of approximately one thousand capacity, a playground of 60 to 70 sq. ft. per pupil is very satisfactory. This does not mean, however, that additional area cannot be used to advantage nor that an area somewhat smaller is useless.

Whether or not the ground is to be used as a community play field also has a bearing upon the size. For this purpose a much larger area is advisable. The surfacing of play areas is a subject about which there is a great divergence of opinion. For senior and junior high school activities, it is desirable to have the play area of grass. The reason for this can be readily understood when note is taken of the types of play, such as football, soccer, or baseball, which are regulation activities for these groups.

A grass surface is also recommended for the elementary schools and would be more extensively used except for the fact that it is practically impossible to maintain such coverings due to the excessive use of the areas. Grass and hundreds of trampling feet cannot be made to occupy identical areas for long. Elementary school playgrounds, consequently, have almost every type of artificial surface — plain dirt, clay, gravel, slag, cinders, crushed stone, and brick, asphalt, or even cement pavement. These materials alone and in various combinations are extensively used. A local choice will be largely dependent upon the funds available for the purpose and the availability of materials. In a final analysis, the best surface is the one which is reasonable in cost, and will give to the users a surface which is compact, resilient, well drained, free from dust, and not unduly destructive of children's shoes and clothing. Certainly it is desirable to provide a surface which is usable a maximum number of the days in the year, commensurate with initial cost, safety, and maintenance.

If play equipment is provided, it should be so located that it interferes as little as possible with activities which are lively in nature and which require large areas. Usually the very small children are the users of this equipment, and it is not safe nor practical planning to locate the apparatus where its users are likely to be injured through other activities carried on at the same time. Generally speaking, few accidents occur from the proper use of playground equipment, but many injuries do result from the abuse of equipment. It seems necessary, therefore, that close supervision be maintained over the activities on playground equipment.

Many times by careful planning, it is possible to provide a small play area for the exclusive use of the kindergarten children. This area should be separated from the larger playground, and preferably at a safe distance away. As it will be used only in good weather, it may be maintained with a grass surface. Plantings may be introduced, and a well-located tree or two will furnish considerable comfort to the little ones.

Garden and Service Areas

Another area which may be a part of the "living area" is the school garden — not large productive garden plots — but small flower or vegetable gardens established and worked in connection with the science classes or the school-garden groups. Many small and otherwise useless areas may be developed as experimental gardens in which the science classes may work out ideas in conjunction with the school conservatory. These areas should, of course, be so located that interference from other necessary activities is at a minimum. In many instances these gardens, both vegetable and flower, provide for some pupils' outlets for a natural ability which is found in no other way. It is surprising how quickly the children learn to plant and maintain these areas and what a satisfaction they derive from so doing.

The last group of areas to be considered are those which function as "service units" in the operation of the building.

These are smallest in number and in area, but it is exceedingly important that they be planned correctly and developed so that the necessary services may be carried on in the most efficient and least disturbing manner.

A large variety of supplies for educational work, maintenance, and operation must be delivered to the building, and it is highly desirable that substantial driveways be constructed in order that delivery units may unload at the service entrance to the building. By providing a service driveway and entrance, the temptation to drive loaded trucks upon sidewalks, across lawns, or over playgrounds in order to make deliveries of heavy or bulky materials will be eliminated.

The service units of a building should be so located that only one driveway is necessary, and this should be of ample width and of such construction that it will allow for heavy loads and the reasonable manipulation of trucks.

If a parking ground is to be provided, and it is desirable to provide one for a limited number of vehicles, this ground should be

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General Exterior, Bloomfield Junior High School, Bloomfield, New Jersey. — Starrett and Van Vleck, Architects, New York City.

Cooperative Planning Builds a School

Edgar S. Stover[1]

The rapid growth of secondary schools in the past 15 years is shown in Bloomfield, N. J., where there was an increase in high school enrollment from less than a thousand to over 2500 students. The result of this increase was the crowded condition of school facilities to the point where secondary education ceases to be efficient. Equally pressing was the need for modernizing the school program.

In September, 1937, the board of education decided to build a junior high school and revamp the school program. It further decided to approach the project so that the results would withstand critical analysis.

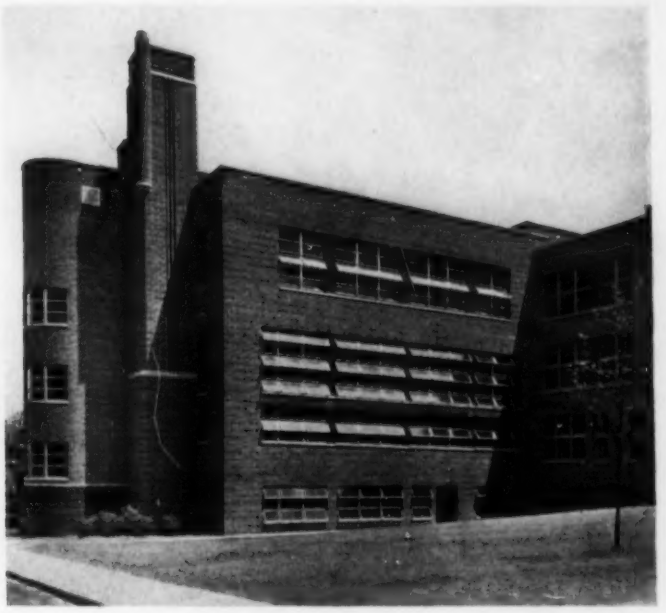
The preparation of the educational program was placed in the hands of Henry T. Hollingsworth, principal, and Alfred H. Skogsberg, vice-principal; the firm of Starrett and Van Vleck of New York were appointed architects. The educational program and building plans progressed simultaneously and co-ordinating with Edgar S. Stover, superintendent of schools, and Frank J. Hochstuhl, Jr., secretary of the board of education, a record of accomplishment in cooperative school planning and building construction was established.

The first step in the preparation of a program that would meet the needs of the school population was an educational survey covering 1572 pupils or 97 per cent of the prospective junior high school group. Upon enrollment, the prognostications made were found to be 98 per cent correct. Inherent in such a survey was an estimation of needs of the future, so the program would be flexible enough that modification would not destroy its essentials. This presupposed, of course, a

The cooking room reproduces typical conditions in good American homes.

[1]Superintendent of Schools, Bloomfield, N. J.

The cafeteria uses modern materials and modernly designed furniture, all planned for utmost utility and minimum upkeep.



The west court is as attractive as the main street front of the building.

dynamic conception of education on the part of the men making the survey and the board of education to which they reported. Another phase of the study was an analysis of the existing types of junior high school programs since the cost of operation and maintenance on Bloomfield's budget was very important.

Program Determined

From the analysis of the data and the financial ability of the town it was decided that the best type of program for Bloomfield was a general developmental one, with the emphasis on the exploratory and vocational functions varying in kind and degree with the changes in school population.

The guidance program was centered about the home room, with plans for individual and group guidance so outlined as to produce a maximum of efficiency and economy.

After the school population was studied, the basis of the guidance program formulated, and the curriculum of the school planned, the architects began to design the structure. Thus the completed building was erected to house a previously known educational program, adaptable enough to meet the needs of a changing school population.

Teachers Trained for the Program

In May, 1938, the faculty was appointed. Since the group represented widely dissimilar sources, backgrounds, and experience, the time lapse before the school opened allowed the teacher training necessary for the complete program. The board of education hired four men from Montclair State Teachers' College to work with the group for a semester. In group meetings, the outlines and ranges of the courses of study were set. During the following year, the courses of study were completed and integrated.

When the school opened in September, 1940, the results of the preliminary work were seen. Each of the 60 teachers had lists of his classes, a written analysis of their characteristics as groups, a copy of the courses of study, a manual of operations, complete familiarity with program and building, and the minimum reference books necessary to supplement the texts. Fifteen hundred boys and girls entered a new building, under a program completely new to them, proceeded directly to their previously assigned home rooms, and followed the schedule without a hitch the first day of school.

Designing the Building

The general plan of the building was affected by many conditions. From the many preliminary plans prepared, a modified form H plan with large open courts facing each side of the plot was finally selected as the ideal solution of all the limitations surrounding the work of the architects.

The architectural style has received enthusiastic comment and sets new patterns in the school designing field. It cannot be appropriately classified with any of the works of past centuries, nor can it be given that overworked tag of "modern." The architects have created a new style which might be fittingly defined as Twentieth Century American. The structure has been designed with a series of plane and curving wall surfaces, generally unrelieved by ornamentation or cornices, in which are spaced the grouped window openings to effect a pleasing composition and the maximum benefit of daylight.

The massive simplicity of the building, together with the great expanses of plain brick walls, necessitated a wall material attractive both in itself and in arrangement. The general brick walls in use would have presented a monotonous and uninteresting result and entirely out of scale with the great building. Accordingly, the architects developed an entirely new brick bond, consisting of horizontal bands of oversize brick (5 by 12-in. face) carried continuously around the building. Between each of these bands are three courses of standard size brick of the same quality and color range laid in the staggered monk's bond. With this entirely new pattern of brickwork the vast expanses of plain walls have become

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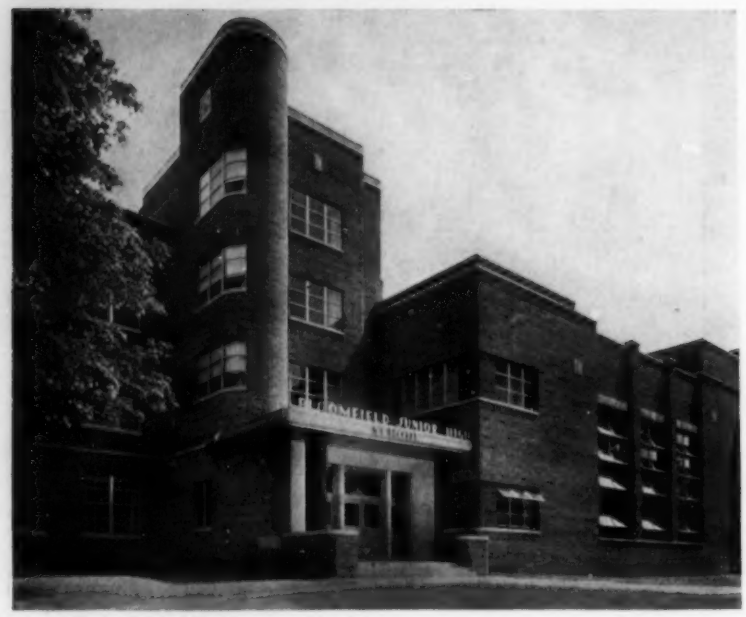
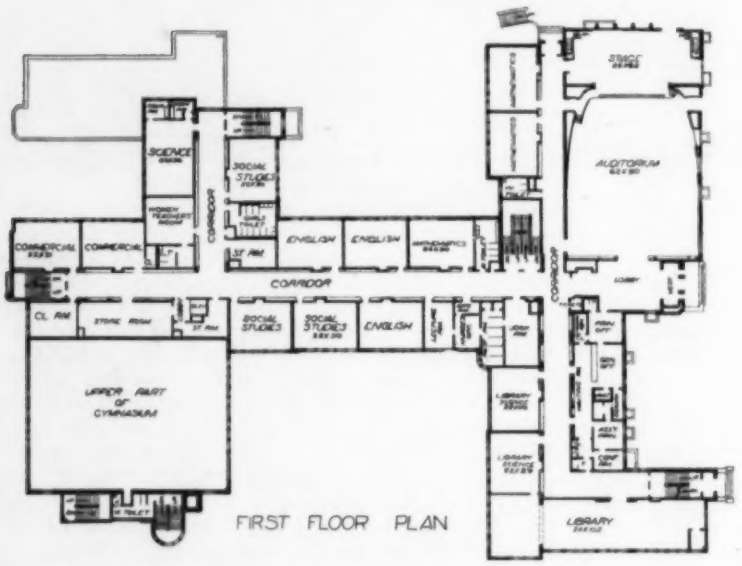
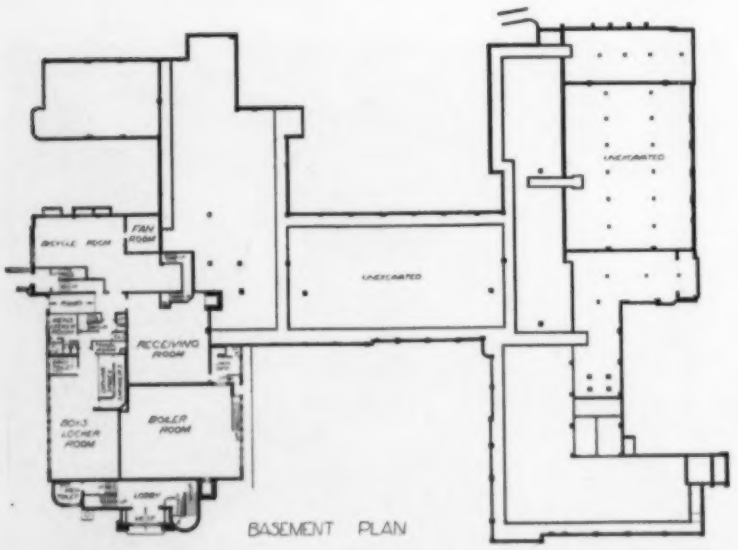
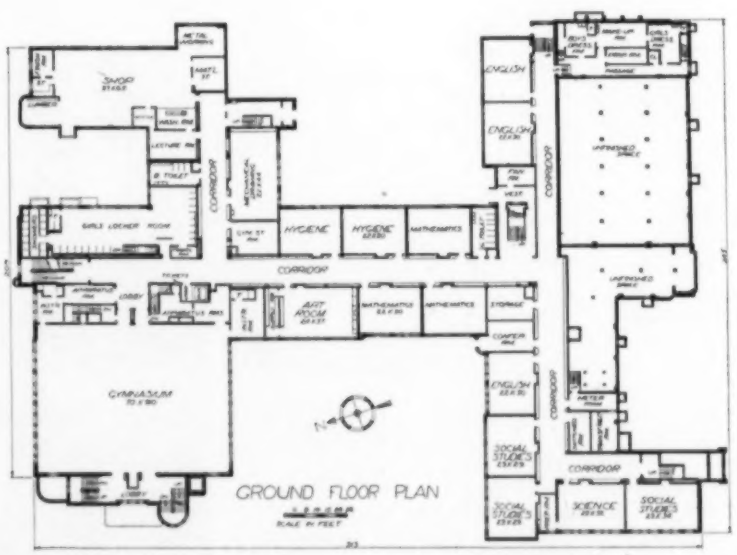
The industrial arts shop is equipped for woodwork and metalwork.



The main entrance of the Bloomfield Junior High School, Bloomfield, New Jersey.

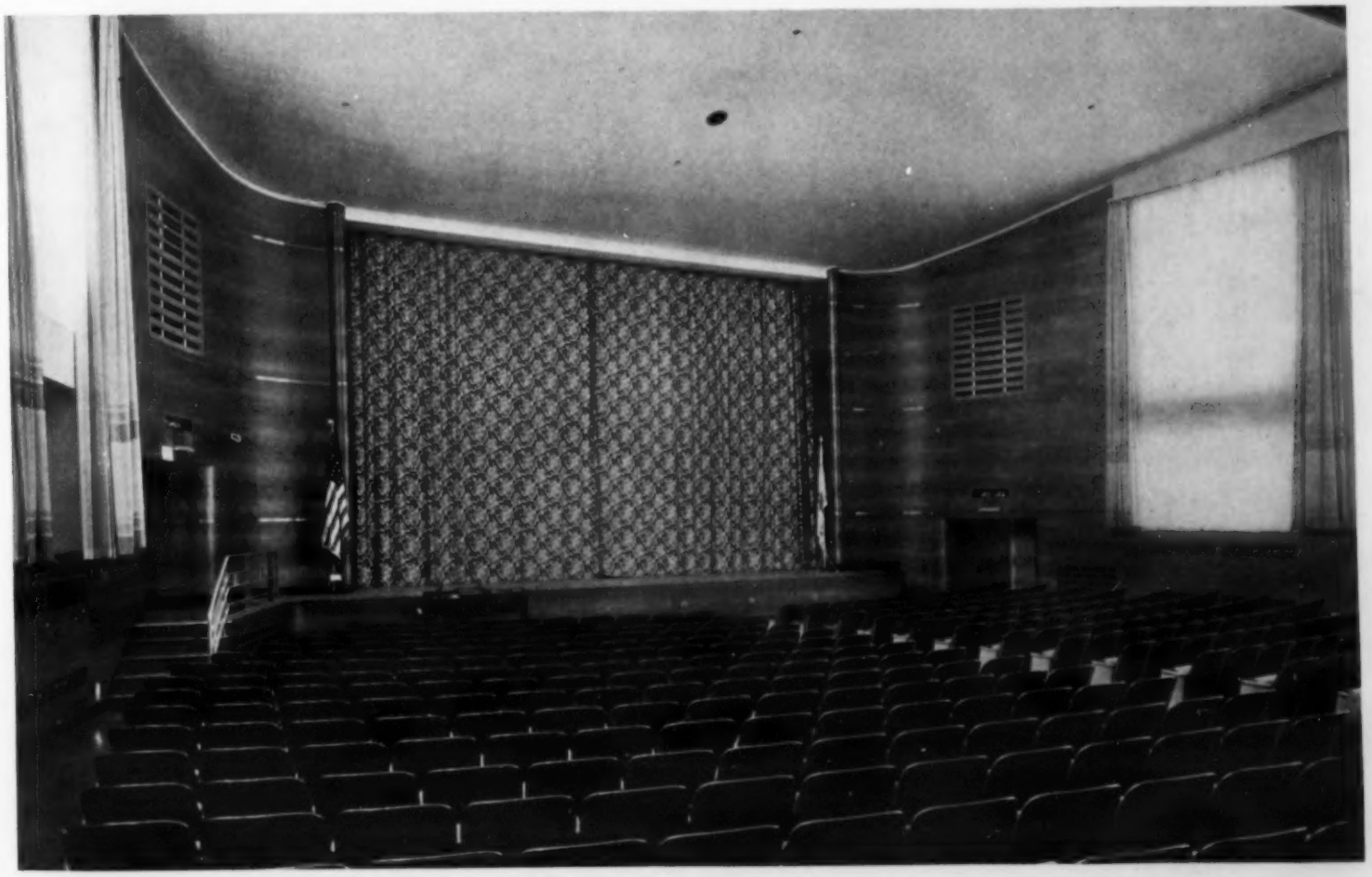






The Bloomfield Junior High School is planned to utilize to the full an irregular site with differences in grade. Ingenious arrangement of entrances, of larger units, and of departmental rooms makes the building remarkably integrated for a wide variety of uses by children and adults, all without interference or added cost for construction.

The Bloomfield Junior High School library is not merely a showplace. It is genuinely the academic center of the school.



The Bloomfield Junior High School auditorium is streamlined for utmost utility by pupils and adult groups.

Planned and Built for Activity

Thomas O. Larkin School, Monterey, California

J. R. Croad[1]

Rapid growth of school population, due to the building of Fort Ord, necessitated the construction of several small buildings and additions to existing buildings in Monterey. The Thomas O. Larkin School was constructed from a small building fund before federal aid was available. Simple, inexpensive construction was necessary to provide the maximum of classroom space with the limited funds. However, as the building was to be a permanent part of the school system, educational planning and future maintenance were important.

The educational planning of the classrooms resulted from a series of conferences with a group of teachers, the architects (Robert Stanton and Thomas B. Mulvin, of Del Monte), Dr. Bursch of the California State Division of Schoolhouse Planning, and the superintendent of schools. Teachers were requested to analyze the activities and teaching procedures in their classrooms to determine the arrangement of space in relation to light sources, storage facilities, library shelving, storage space, and exits. They studied the materials of instruction used during the year and were asked to suggest space requirements, convenient location in the room, and proper storage.

The teachers' first plea was for convenient storage space designed for present-day teaching equipment and supplies, and flexible enough to anticipate new needs. This was followed by requests for adequate pinning space, bookshelves, attractive display areas, built-in easels, a workbench, and running water. They emphasized the need for work areas planned for efficient supervision and a minimum of disturbance for other children in the class. All these requests by the group of teachers were incorporated in the building.

[1]Superintendent of Schools, Monterey, Calif.

Library may be converted into a community room. The alcove may become a miniature stage. This room adjoins a teachers' room where cooking facilities are available.

Covered access to building from playground provides efficient supervision of toilet rooms, playground equipment, lockers, and play area.

A frame stucco building on a concrete slab foundation, using a factory type of construction, insured the lowest cost under the California Earthquake Law. Need for economy did not result in the elimination of essential maintenance and educational features. A copper roof, tile walls and floors in the toilet rooms, high-grade plumbing and hardware, asphalt-tile classroom floors, and well-built cabinetwork were specified.

Thoughtful designing resulted in other desirable features at no additional cost. The bilateral lighting, controlled with Venetian blinds, has insured adequate light without glare. Tests on overcast days have shown a minimum of 50 foot-candles at the desks, with blinds adjusted for maximum comfort. No artificial light has been necessary.

A unique arrangement for heating the classrooms is a feature of the building. The "lost" space above each of the cloakrooms houses an individual heating plant in a soundproof room. Fresh air from an outside duct is heated by a gas furnace and is circulated through the classroom. Warm air is returned to the furnace through the cloakrooms, insuring dry wraps. A thermostat clock as well as a manually controlled switch insured well-regulated heat whenever it is needed.

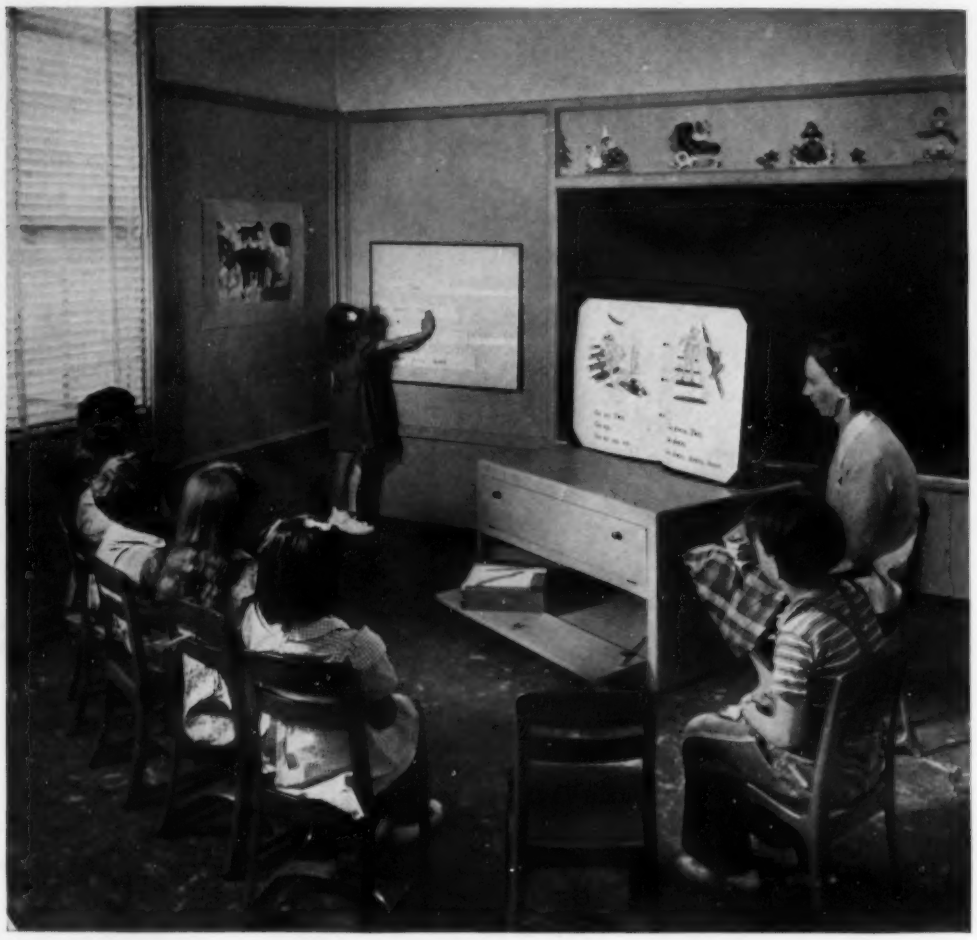
The same cooperative method was used in planning the building as a whole. A very convenient relationship of classrooms to play areas, to lavatories, to the office, and the health room resulted. The problem of playground supervision has been greatly reduced by the arrangement of toilet facilities, play-

Illustration of evenly distributed light over the entire classroom through the use of sloping ceiling and bi-lateral lighting.

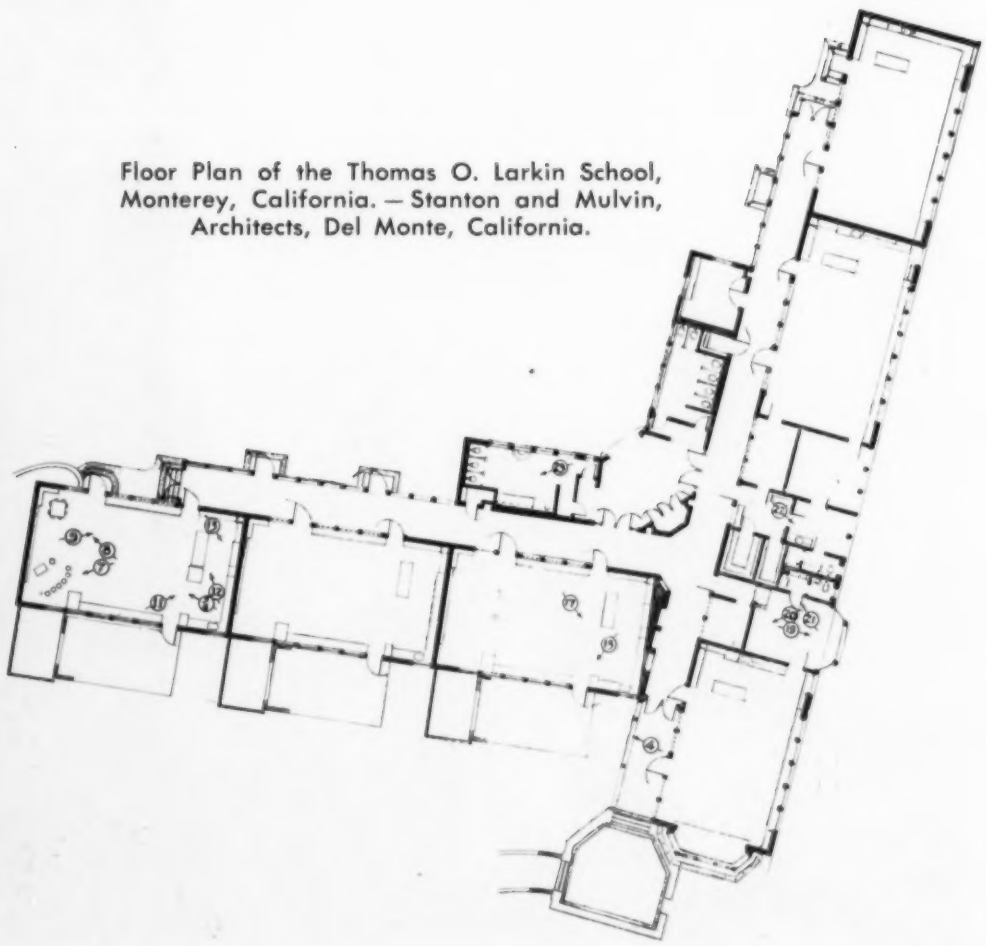
Shows relationship between interior classroom and exterior work area. Work area is easily accessible, eliminates disturbance of other classroom activities, and is easily supervised by the teacher.

(Left) A classroom looking toward the reading alcove, with pupils at work.

(Below) The health cabinet and sink.



The ingenuity of arrangement of the Thomas O. Larkin School is evidenced in the illustrations on this page and on pages 35 and 37. The teachers' bookcases above are intended to be accessible only to the teacher. Deep and wide drawers permit of easy access to project materials and special supplies. The illustration immediately below shows a section of the pupils' bookcases and of a novel revolving stand for pupils' lunches. The latter is fully ventilated and entirely sanitary. Teachers have found the portable reading materials cabinet particularly helpful (upper right). It can be moved to any part of the room where group work is to be carried on. The top drawer is arranged to contain charts and the lower shelf provides space for books, flash cards, etc. All wall space in the primary classrooms other than blackboards is removable pinning board where reference materials and exhibits may be shown.



Floor Plan of the Thomas O. Larkin School, Monterey, California. — Stanton and Mulvin, Architects, Del Monte, California.

General Exterior, Larkin Elementary School, Monterey, Calif. — Stanton and Mulvin, Architects, Del Monte, Calif.

ground equipment, lockers, and a covered play area. The facilities are readily accessible to playground and classrooms and may be supervised from the play area or the interior of the building.

THE THOMAS O. LARKIN SCHOOL, MONTEREY, CALIFORNIA

Construction Details

Contract let August 13, 1940, and building occupied April 25, 1941.

The site measures 242 ft. on the principal frontage and is 660 ft. deep.

The school organization includes grades one to six.

Rooms: The building includes an office, 5 classrooms, a library, and 2 teachers' rooms.

Exterior trim: Stucco and wood

Construction: Frame, to comply with earthquake laws of California

Corridors: Colored-cement floors

Classrooms: Floors asphalt tile on concrete slab; walls, plaster; ceilings, painted wood

Toilet rooms: Tile floors and wainscoting

Heating: Gas-fired, unit heaters of the noiseless type

Ventilation: Awning-type windows

Heat control: Thermostat

Electrical equipment: Indirect lighting, intercommunicating public-address system

Plumbing: Heavy-duty school-type fixtures and equipment; Bradley washfountains

Total capacity: 210 pupils

Total cost of building: $56,400; of equipment, $2,500; total cost, $58,900

Cost per cubic foot: 27 cents

Cost per pupil: $280.48

A corner of the classroom showing removable tool cart. Cabinet designed for storage of teaching supplies accessible and easily supervised.

The library in the Washington Junior High School, Rockford, Illinois, is most attractive in color and finish and is adequately supplied with reference books and supplementary texts to serve all academic and vocational departments.

Functionalism Highlights Rockford's High Schools

Selmer H. Berg[1] and Gilbert A. Johnson[2]

The city of Rockford built two new senior high schools, a junior high school and an elementary school addition in 1939–40 at a cost of $3,244,478 with a PWA grant of $1,472,727 accounting for 45 per cent of the total expense. Many years of planning and preparation preceded the actual construction program. In 1929–30 a comprehensive school plant survey was made, which resulted in the purchase of the sites for the high schools. Thus many of the important preliminary problems, such as the selection of sites, were settled 10 years before building operations began, thereby eliminating some of the controversial issues and allowing time for adequate appraisal of the general program.

Type and Location

The buildings are of the open-type modern design with a center section of classrooms flanked by auditorium and gymnasium wings. The senior high school sites, of 15 and 18 acres respectively and the junior high school site of nine acres, provide adequate playground areas for outdoor physical-education classes and athletic practice fields. They are located near the outer edge of the present residential sections of Rockford, far from the downtown business section traffic. Surrounded by homes and properly zoned against undesirable business places, these spacious sites give the schools an attractive and wholesome environment. Since the facilities and equipment of the two senior high schools are almost identical, they will be treated as one in this article.

Functional Planning

The educational program of the community served as the basis for planning the buildings.

The daily lunch is a happy experience in the attractively colored and well-equipped cafeterias of the Rockford High Schools.

[1]Superintendent of Schools, Rockford, Ill.
[2]Architect, Rockford, Ill.

An air view of the East Senior High School, Rockford, Illinois, shows the adequate parking space and the large playground at the rear.

Board members, teachers, and administrative staff participated in formulating the educational specifications for the architect. This cooperative effort constantly sought this maximum of educational adequacy and technical efficiency. Effort was made to provide those facilities which would serve the needs of pupils, teachers, and patrons. Flexibility of arrangement and adaptability of materials for the many purposes to be served were considered in every phase of planning.

Acoustical treatment throughout the buildings improves study conditions and decreases nervous tension. Departmental display cases and bulletin boards provide instructional motivation. Conveniently located service facilities provide a proper flow of traffic and aid in maintaining cleanliness. A central radio

The swimming pools of the Rockford High Schools are patronized both by school and community groups.

The West Senior High School, Rockford, Illinois, has been erected at the edge of a growing residential section where it is readily accessible. — Gilbert A. Johnson, Architect, Rockford, Illinois.

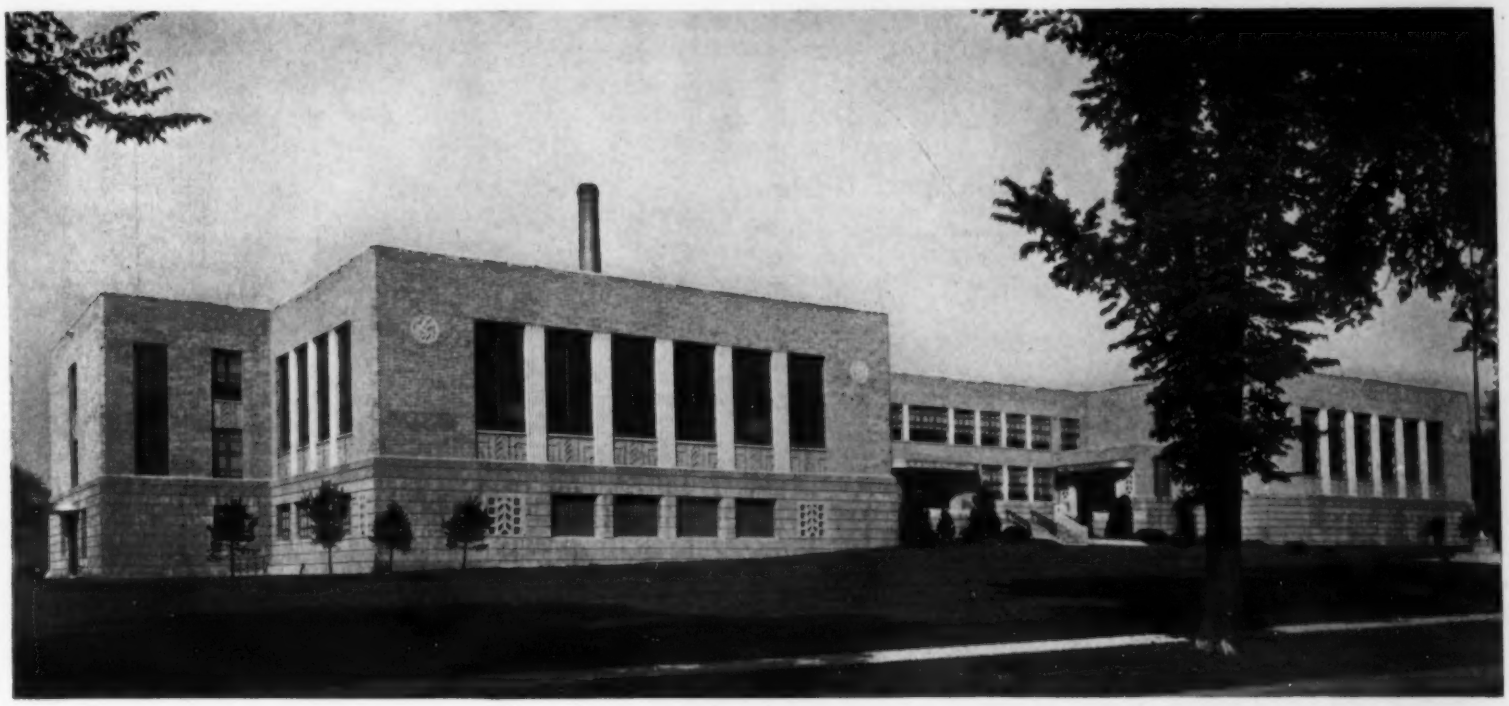
system connecting all rooms brings the activities of the world to the classroom and affords an effective medium for reaching the entire student body without an assembly. Opaque shades in several rooms make the use of visual aids convenient.

The Typical Classroom and Corridor

Academic classrooms are planned especially for the type of work to be done. They are equipped with blackboards and bulletin boards according to the needs of the subject taught in the particular room. Both the front and rear walls are covered with the type of board needed. The corridor wall may have additional board space besides containing recessed open book shelving, enclosed storage shelving, and a teacher's wardrobe. Each department is supplied with a few rooms of extra large size to accommodate a conference or worktable besides the required number of movable desks. All desks, tables, and chairs are equipped with rubber feet or metal guides to protect the asphalt-tile floors. Every classroom has an electric wall receptacle, a thermostat, an electric clock connected with the master system, an intercommunicating telephone, a radio loud-speaker, and a door closer on the corridor door. The teacher's desk is of the two pedestal type having one drawer for standard filing.

The corridor walls have a wainscot of cream color stipled glazed tile, raised to the

Direct indirect lighting, built-in bookshelves, an acoustic ceiling, a rubber tile floor, and especially designed tables and chairs characterize the libraries of the Rockford High Schools.



General Exterior, Washington Junior High School, Rockford, Ill. — Gilbert A. Johnson, Architect, Rockford, Illinois.

height of the recessed lockers. In the stair halls the glazed tile extend the full height with a panel of glass blocks in the outside wall. Floors are of terrazzo with a light-colored center field and dark-colored border and base.

The Library

The library is located in the center of the building, on the first floor, opposite the main entrance. It is the heart of the educational activities as well as of the physical plant. Conference and workrooms are located at each end. There is a charging desk at either side of the main entrance to the library. Adjoining and opening into the library at one end is a study hall which allows pupils to readily shift from one room to the other, thus making the library accessible to a greater number of pupils. The room has indirect lighting, rubber-tile flooring, comfortable furniture, and a capacity of 150.

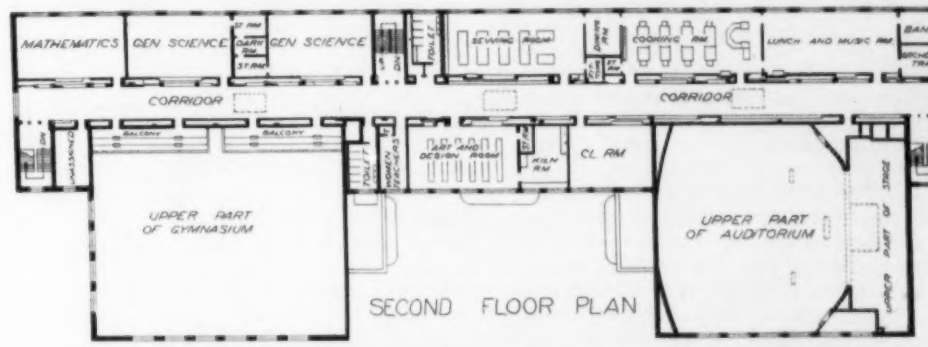
Science, Commerce, Arts

Specially equipped rooms are provided for chemistry, physics, and biology. The facilities include instructors workrooms, darkrooms, and suitable storage cabinets for equipment. Between the physics and chemistry laboratories is a special demonstration room equipped with a demonstration desk, elevated seating, and projection screen and darkening shades for showing slides and films. The biology rooms have running water, aquariums, and a plant-growing room.

The commerce department provides for bookkeeping, typewriting, shorthand, and office practice. Typewriting rooms have acoustical treatment with a higher sound absorbing coefficient than the regular classrooms, which reduces the fatigue of both pupils and teachers.

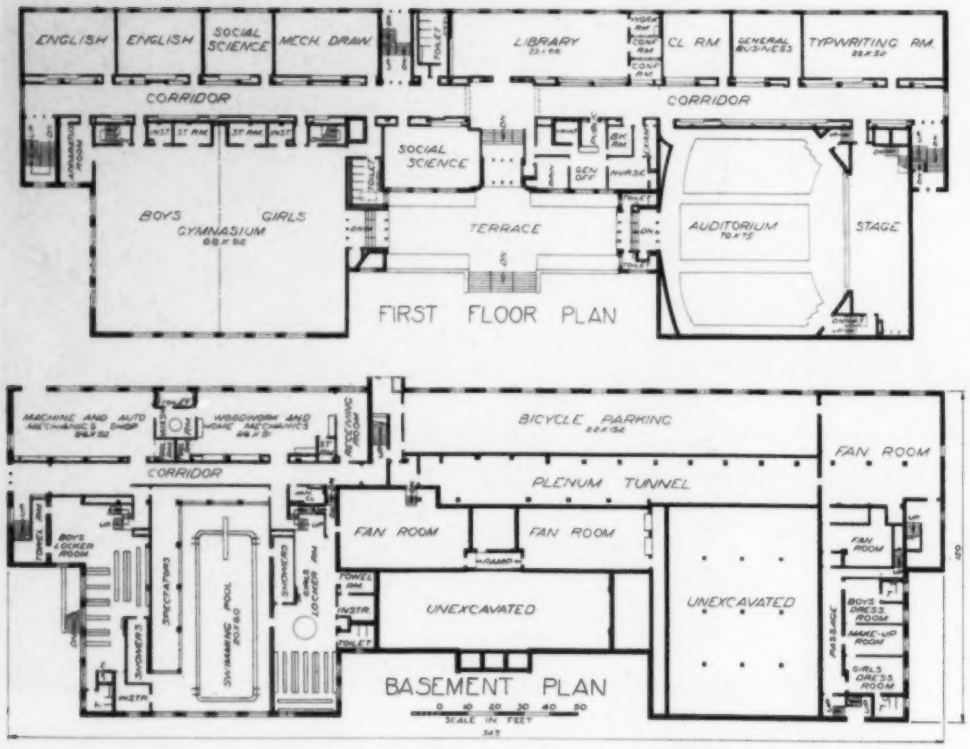
In the household-arts department there is a foods laboratory with an adjoining dining room and parlor. The sewing room has the usual type of worktables, an adjoining fitting room, and a storage room. A corridor case which is used to display the work of the department attracts constant attention.

The art department includes a general art room and a craft room. Located between the



Washington Junior High School, Rockford, Illinois.

The auditorium of the Washington Junior High School has been especially planned and decorated to attract younger children who make up the student body.



Floor Plans, Washington Junior High School, Rockford, Illinois. — Gilbert A. Johnson, Architect, Rockford, Illinois.

two rooms are the kiln and storage rooms. There are special workbenches, display boards, and a corridor exhibit case.

For Music Activities

Band and orchestra are housed in a large rehearsal room on the top floor. Several practice rooms, instrument and uniform storage rooms adjoin the rehearsal room. Filing cabinets for music are built along the wall in the director's office. All practice rooms are suitably soundproofed.

The choral room has banked tiers of seats arranged in a semicircle to accommodate about 100 pupils. Two practice rooms and music and uniform storage cabinets are included. The glee club and a cappella choir practice in this room.

Factory Type Shops Cut Costs

The industrial-arts shops are housed in a one-story unit, connected with the main building by a corridor. This unit is of a factory type construction with structural steel supports, walls of lightweight concrete blocks, and a precast concrete slab roof giving the atmosphere of actual shop conditions. The floors are of creosoted 2-in. wood blocks with the grain laid in vertical position. Locating the shops in this one-story unit instead of including them in the main building saved approximately $25,000.

Triple Duty Cafeteria

The large cafeteria seats 500 pupils and is also used as a supplementary study hall and social center. A separate dining room is provided for the teachers. The service counters are in the kitchen, hence by closing the doors which lead to the serving lines the dining room is entirely isolated. The floor is constructed of unit wood blocks in herringbone pattern. Tables and chairs are of a folding type so that the room can easily be cleared for social functions. During the lunch hour music may be furnished on the public-address system.

Gymnasium and ROTC

Physical-education facilities are provided for both boys and girls. The main gymnasium, 90 by 105 ft., is used for the boys classes, basketball, and indoor ROTC drill. The seating capacity is 1800. Under each permanent bleacher is an auxiliary room for corrective work and indoor sports. The boys use one side and the girls the other. The girls also have a separate gymnasium for their regular physical-education activities. In the dressing rooms lockers are provided for all students. The shower rooms are of the open type.

The swimming pool is 30 by 75 ft. with a depth of 3½ ft. at the shallow end and 9½ ft. at the deep point. It is constructed of glazed tile with abrasive tile flooring and equipped with 14 underwater lights. All windows are constructed of directional glass blocks. The pool is provided with vertical pressure filters 6½ ft. in diameter and 7 ft. high which are capable of handling all the water from the pool within six hours, chemical feeds, flow indicators, chlorinator, instantaneous heater with capacity of 18,000 gal. per hour and the necessary recirculating pumps.

The spectators' sections are located on one side and at the ends of the pool. The floor of this area is elevated 6 in. above the floor surrounding the pool and is separated by a curb and railing. Although the application of acoustical material on the ceiling required special care due to the concrete joists it has greatly facilitated class instruction.

The ROTC quarters include a classroom, storage vaults for clothing and rifles, an instructor's office, and a rifle range. The rifle range measures 40 by 50 ft. and has 10 shooting lanes with mechanically operated targets under bright lights.

Auditorium and Little Theater

The main auditorium, including the balcony, seats 1200 people. Large groups can be accommodated on the 30 by 80-ft. stage which is equipped with a modern lighting system. There are boys and girls dressing rooms and a make-up room. Besides the regular acoustical material applied to the ceiling, exposed lightweight concrete blocks above the wainscot have materially added to the acoustical correction of the auditorium. These blocks

The development of a complete physical education program has dictated the character and equipment of the splendid complete gymnasiums of the Rockford High Schools.

The lobby of the Little Theater, East Senior High School, Rockford, Illinois, is attractive in color and modern in finish.

The machine shops in the Rockford High Schools are equipped with the very latest types of production machinery.

have proven to be a very economical acoustic material, and sprayed with a coat of casein paint, they give a satisfactory appearance in a large room.

Parallel to the stage of the main auditorium is located the little theater, seating 180. It is equipped with a stage, including lighting and curtains. The accommodations are adequate for all types of meetings and activities not having a large attendance, and for rehearsals of small groups. It serves the school and the community as a utility room.

Heating Plant

Fuel costs in the two new senior high schools as compared with the old central high school increased only $1,597, or 14 per cent during the first year of operation, although the combined areas of the new schools are over 50 per cent larger than that of the old school.

The heating plant is housed in a separate unit at the rear of the main building. It consists of three 250 h.p. portable firebox boilers operated at low pressure. For the general heating of the building the steam piping is a downfeed system with the main run in the attic and risers dripped below the first-floor level. Coal and ash bunkers are provided above the boiler room, with a continuous bucket conveyor delivering coal and ashes to the bunkers.

The coal is dumped into a hopper outside the boiler-room wall and spouted to the bucket conveyor, below the boiler-room floor, which delivers it to the coal bunker. From the bunker the coal is spouted to the stoker hopper. Through manholes and spouts in front of each boiler, the ashes are dropped to the bucket conveyor which runs to the ash bunker. From this bunker ashes are spouted to the trucks.

A central fan system of ventilation is used in one school and unit ventilators in the other. Separate systems of heating and ventilation are used in the auditorium, gymnasium, cafeteria, and swimming pool.

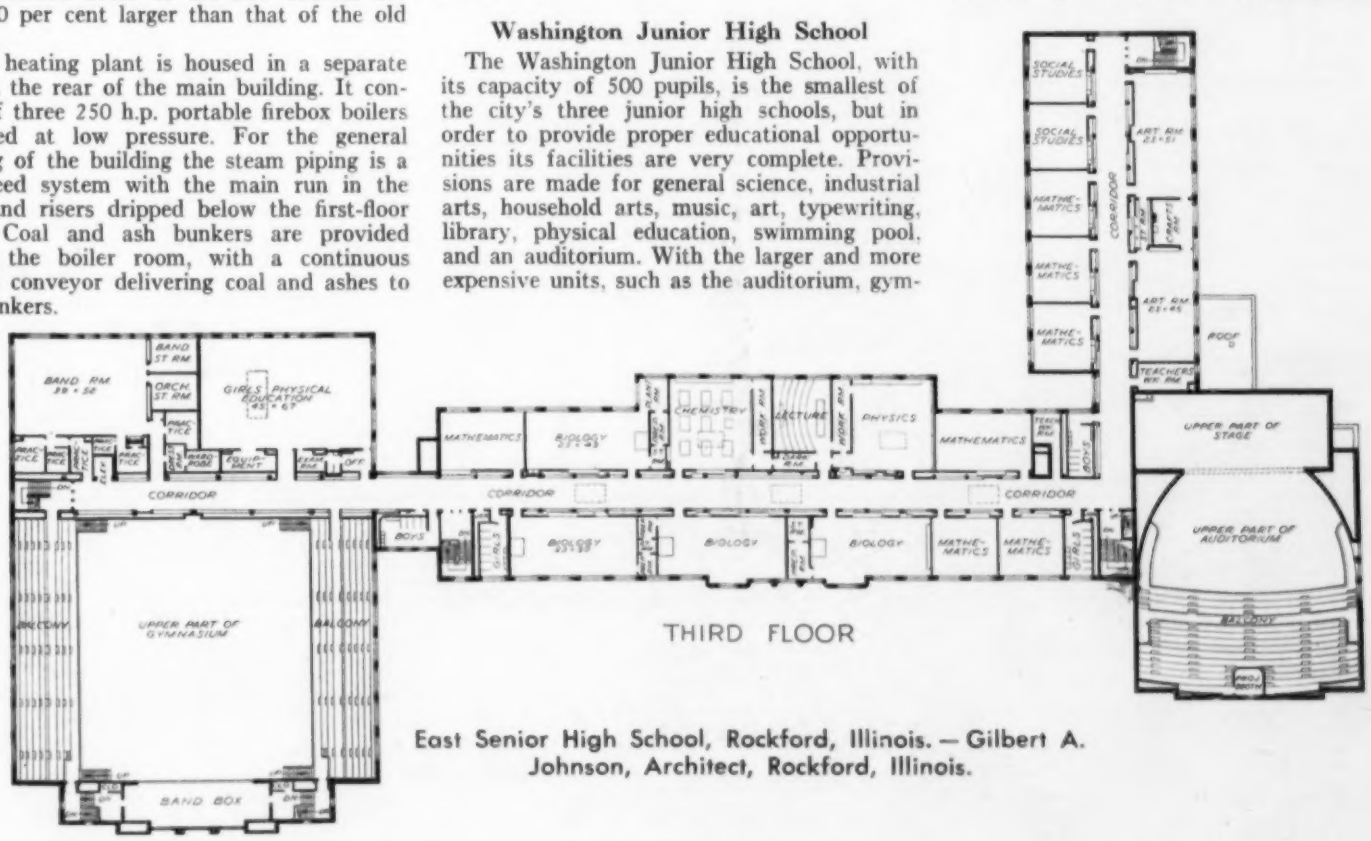
In the basement of each building there is a large bicycle storage room which can be reached by a ramp directly from the outdoors.

Washington Junior High School

The Washington Junior High School, with its capacity of 500 pupils, is the smallest of the city's three junior high schools, but in order to provide proper educational opportunities its facilities are very complete. Provisions are made for general science, industrial arts, household arts, music, art, typewriting, library, physical education, swimming pool, and an auditorium. With the larger and more expensive units, such as the auditorium, gymnasium, and swimming pool already provided, and the building so arranged that additional classrooms can be added as needed, the pupil capacity can be greatly increased at a moderate cost.

Acoustical material has been applied throughout the building with the exception of the corridors. Individual lockers are recessed in the corridor walls. The corridors have a wainscot of vitreous tile and a red quarry tile floor. The building is equipped with an intercommunicating telephone system and an electrically operated master-clock system. Classrooms have movable seating, built-in book shelving, storage shelves, teacher's wardrobe, and blackboard or bulletin boards as required by the individual department.

The auditorium seats 600 people on the main floor, with excellent acoustics and lines



East Senior High School, Rockford, Illinois. — Gilbert A. Johnson, Architect, Rockford, Illinois.

The rifle ranges in the Rockford High Schools always attract large groups of boys.

EAST AND WEST HIGH SCHOOLS CONSTRUCTION DETAILS

Exterior — Hytex smooth sand coat brick, buff color (East High); Sanded Claytex brick, cedarwood color (West High).

Construction — Fireproof structural steel and reinforced concrete, roof — lightweight precast cement tile.

Windows — Projected steel sash, inside puttied; shops, industrial steel sash, outside puttied.

Flooring — Classrooms, asphalt tile; corridors, terrazzo; auditorium, cement; gymnasium, cafeteria, science rooms, wood; toilets, showers, swimming pool, ceramic tile; shops, creosoted wood blocks; library, rubber tile.

Walls — Tile and plaster; shops, gymnasium, auditorium, exposed (concrete) blocks.

Ceilings — Acoustical material of a perforated type.

Woodwork — Unselected birch; auditorium, library, walnut satin finish; shops, boiler house, soft pine painted brown and green.

Lighting — Regular rooms, semi-indirect enclosed bowl one-piece diffused opal glass; library, indirect type; auditorium and little theater, recessed fluorescent lamps.

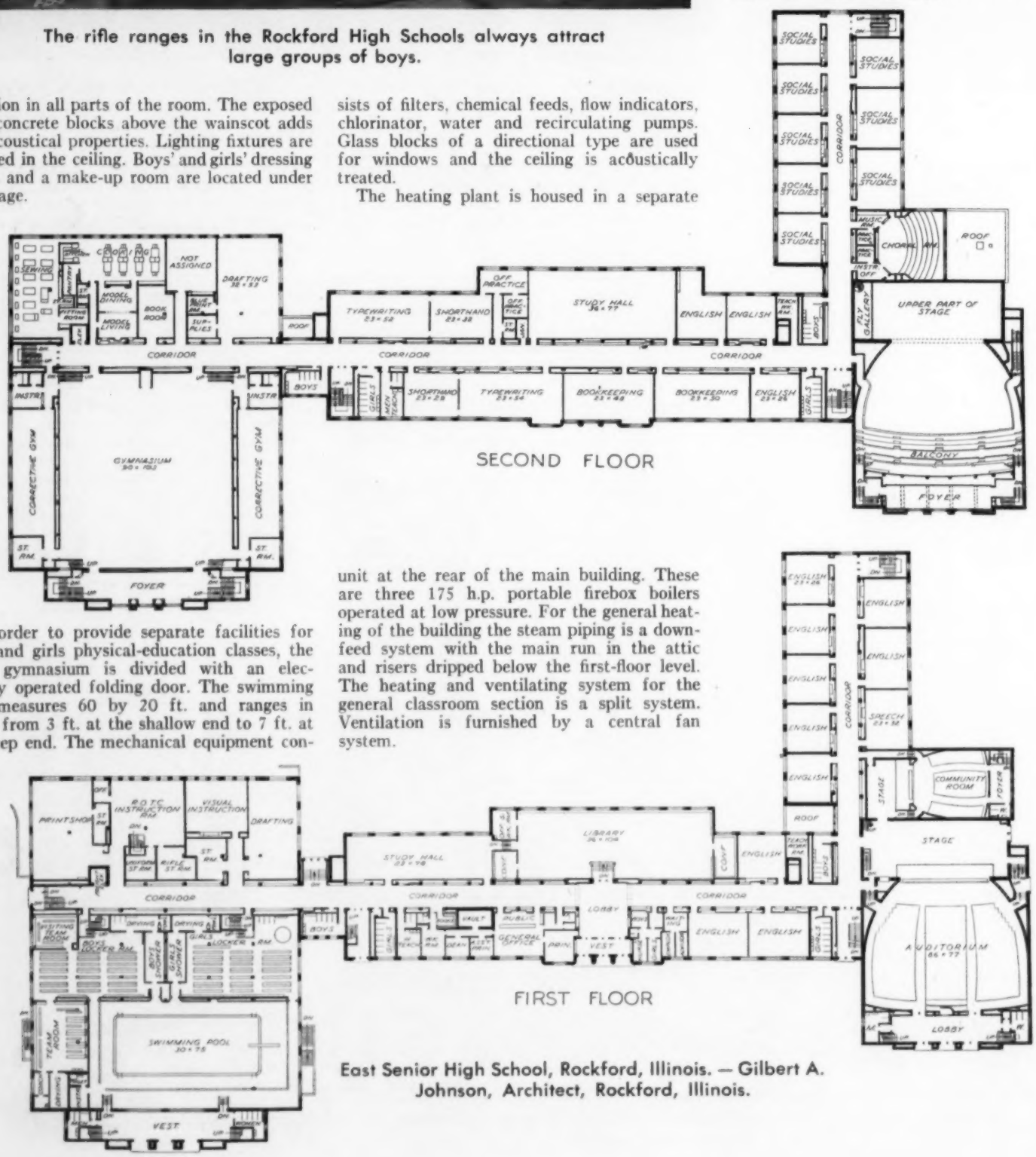
Heating and Ventilating — Three 250 h.p. (steel) firebox boilers; split system central fan ventilation (East High) and unit ventilators (West High).

of vision in all parts of the room. The exposed light concrete blocks above the wainscot adds fine acoustical properties. Lighting fixtures are recessed in the ceiling. Boys' and girls' dressing rooms and a make-up room are located under the stage.

sists of filters, chemical feeds, flow indicators, chlorinator, water and recirculating pumps. Glass blocks of a directional type are used for windows and the ceiling is acoustically treated.

The heating plant is housed in a separate unit at the rear of the main building. These are three 175 h.p. portable firebox boilers operated at low pressure. For the general heating of the building the steam piping is a down-feed system with the main run in the attic and risers dripped below the first-floor level. The heating and ventilating system for the general classroom section is a split system. Ventilation is furnished by a central fan system.

In order to provide separate facilities for boys and girls physical-education classes, the main gymnasium is divided with an electrically operated folding door. The swimming pool measures 60 by 20 ft. and ranges in depth from 3 ft. at the shallow end to 7 ft. at the deep end. The mechanical equipment con-



East Senior High School, Rockford, Illinois. — Gilbert A. Johnson, Architect, Rockford, Illinois.

WEST HIGH SCHOOL

Architects — Gilbert A. Johnson.
Jesse A. Barloga, Consultant.

Site — 15 acres

Building:
Area — 251,033 sq. ft.
Volume — 4,285,389 cu. ft.
Cost per cubic foot — $.285 (building only)
Cost of building — $1,224,566.44
Cost of new equipment — $103,723.79

Schedule of Rooms:	*No. Rooms*
Classroom (regular academic)	30
Science	7
Commercial	8
Household Arts	4
Art	3
Band and Orchestra	1
Choral Rooms	1
Practice Room — Music	9
Industrial Arts	8
Visual Instruction	1
Bookroom	1
Library	1
Conference Rooms	2
Study Hall	2
ROTC	2
Gymnasium	1
Girls' Physical Education	1
Corrective Rooms	2
Locker Rooms	2
Team Rooms	2
Swimming Pool	1
Auditorium	1
Dressing Rooms	3
Little Theater (speech) Dramatics, and Music	1
Offices	6
Workroom	1
Conference Rooms	3
Medical Clinic	4
Rest Rooms	2
Toilets	19
Bicycle Room	1
Receiving Room (supplies)	1

Normal Pupil Capacity — 2000

The auditoriums of the Rockford High Schools are finished in utmost simplicity and dignity. Accessibility, complete stage equipment, and lighting make them efficient for school use and attractive for community groups.

EAST HIGH SCHOOL

Architects — Gilbert A. Johnson.
Willis Hubbard, Consultant.

Site — 18 acres

Building:
Area — 274,044 sq. ft.
Volume — 4,446,052 cu. ft.
Cost per cubic foot — $.285 (building only)
Cost of building — $1,269,142.52
Cost of new equipment — $103,731.11

Normal Pupil Capacity — 2000

WASHINGTON JUNIOR HIGH SCHOOL CONSTRUCTION DETAILS

Exterior — Gray buff cloister brick.

Construction — Fireproof structural steel and reinforced concrete; roof — lightweight precast cement tile.

Windows — Projected steel sash.

Flooring — Classrooms, asphalt tile; corridors, red quarry tile; gymnasium, science, wood; shops, creosoted wood blocks; auditorium, cement; toilets, showers, swimming room, ceramic tile.

Walls — Tile and plaster; shops, gymnasium, auditorium, exposed (concrete) blocks.

Ceilings — Acoustical material of a perforated type.

Woodwork — Unselected birch; auditorium, library, walnut satin finish; shops, boiler house, soft pine painted green.

Lighting — Regular rooms, semi-indirect enclosed bowl one-piece diffused opal glass; library, indirect; auditorium, recessed ceiling fixture.

Heating and Ventilating — Three 175 h.p. (steel) firebox boilers; split system central fan ventilation.

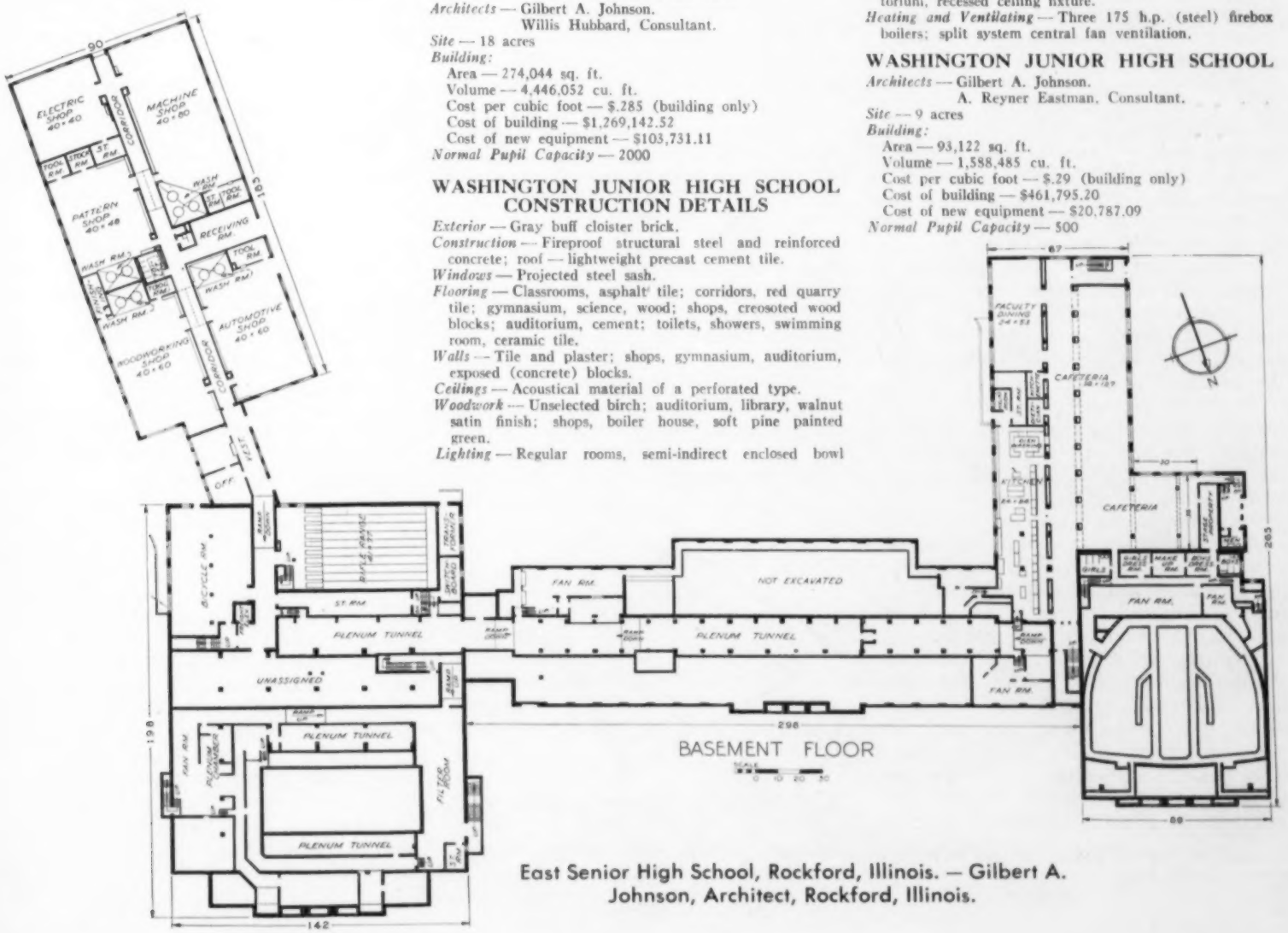
WASHINGTON JUNIOR HIGH SCHOOL

Architects — Gilbert A. Johnson.
A. Reyner Eastman, Consultant.

Site — 9 acres

Building:
Area — 93,122 sq. ft.
Volume — 1,588,485 cu. ft.
Cost per cubic foot — $.29 (building only)
Cost of building — $461,795.20
Cost of new equipment — $20,787.09

Normal Pupil Capacity — 500



East Senior High School, Rockford, Illinois. — Gilbert A. Johnson, Architect, Rockford, Illinois.

The Architect Looks at Schoolrooms

W. R. Greeley[1]

Stereotyped: *Definition* — fixed and unvarying, as are common school classrooms in the United States of America.

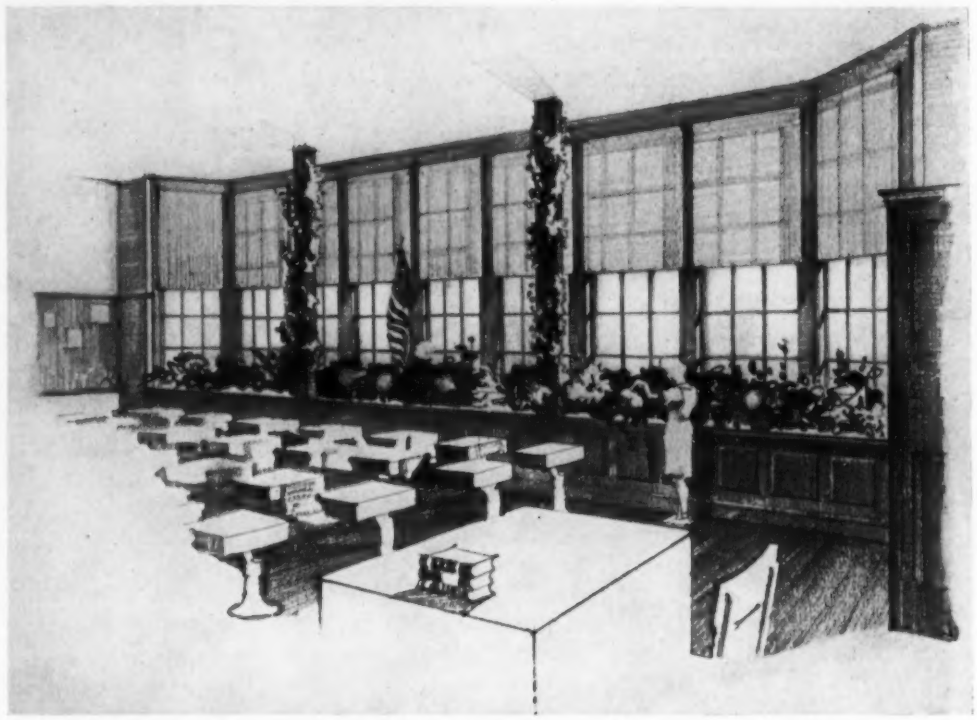
That is castigation and challenge all in one.

The public is occasionally sensitive to the rigidity and unseductive sameness of the classrooms in which children spend so large a part of their waking hours, but the public is largely unaware of what happens at school. A few of the mothers are vaguely familiar with the local schoolhouse because they go to argue with the teachers about what a fine boy their Johnny really is, or they go to a parent-teachers bridge party in the assembly hall. Even these few mothers know nothing of the classroom conditions. They haven't discovered that their little girl is in a room which has a teacher who is "draught conscious" and keeps the room at 82 degrees, so that the children can scarcely keep awake, and moreover are rendered increasingly susceptible to colds and infections. The mothers, little acquainted with classroom conditions as they are, leave the fathers way behind. Imagine a father visiting school! The mere thought is unrealistic!

The architect is obliged to give consideration to the design of the classroom, and is fully aware of the deadly monotony prevailing today in this department of public school building planning. The committee which employs him puts forth its program in terms of "standard" rooms at a standard cost, and unless he is bold and unruly, he will follow the course which they have assumed to be desirable and inevitable. If, however, he is willing to risk upsetting their preconceived program, and to dare fight for flexibility and variety in classroom layout, there are a few directions in which he may explore.

In one school in the South, published in a recent issue of the SCHOOL BOARD JOURNAL, an architect persuaded the board to build rhomboidal classrooms, on a plea that there are advantages in light and fenestration if the customary rectangle is deformed so as to be oblique. Although these claims are not substantiated and perhaps are somewhat fanciful, they indicate the resourcefulness of the designer in wriggling loose from the confining traditions of classroom design.

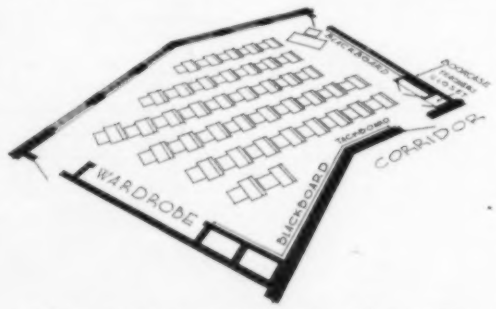
We, ourselves, have been successful only rarely in putting over a novel feature in public schoolrooms. Years ago in Waltham, Mass., the committee let us build classrooms the entire window-wall of each of which was a long bay, filled with glass, and provided with a continuous pebble-filled trough under the windows, upon which the teachers and pupils have since maintained "gardens" of potted plants, and climbing vines. The water required by these plants finds its way, much of it, into the atmosphere of the classroom in the form of much needed humidity. The work with the plants is educational, and they soften and adorn the hard lines of the room with the "umbrageous charity of nature." Our theory has always been that children and flowers go together. The former give off CO_2, the latter take it on. The former consume oxygen; the latter supply it to the air.



The arrangement of windows in a long bay increases the total glass area and permits of interesting displays on cabinets arranged under the window sills.

The Attleborough, Mass., school committee, perhaps reluctantly, has allowed us to lay out some of the classrooms in the Thomas Willett School with a broken window-wall. This provides an abnormal length for window space, and seats the average pupil nearer the light. It also increases the amount of over-the-left-shoulder illumination, and reduces correspondingly the light-in-eyes factor (provided the rows of seats all face directly toward the wall behind the teacher).

The unusual shape is purely incidental to a schoolhouse plan that took advantage of a natural, irregular cliff or steep bank, the lines of which demanded an irregular-shaped building.

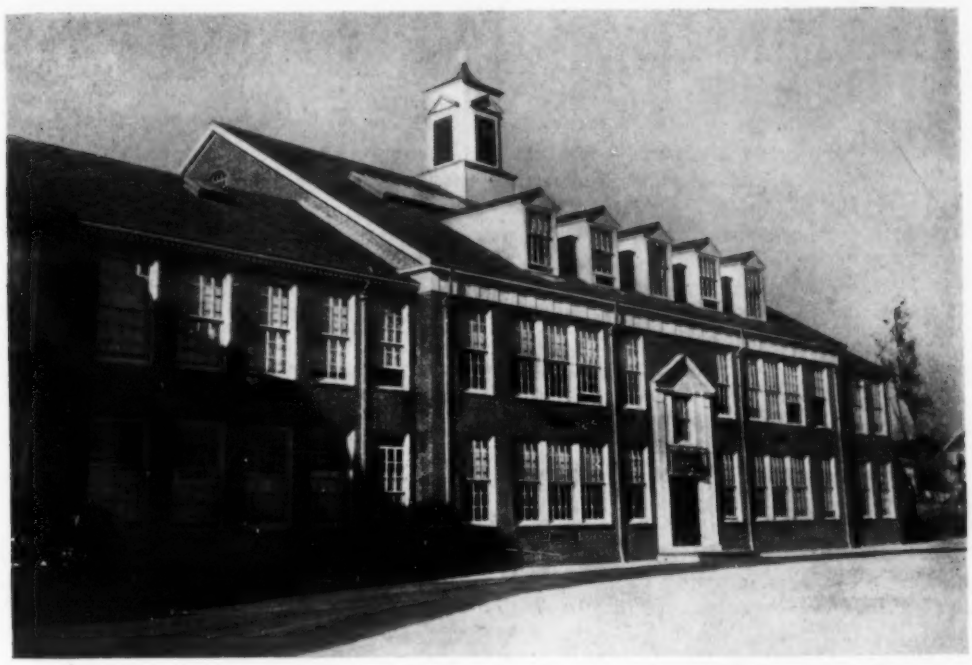


The odd shape of the building site required the odd plans of classrooms. These have been found particularly effective in lighting.

The idea of a prefabricated school has been studied and worked out in various more or less successful forms. Among them is a beehive or honeycomb scheme in which every wall and partition in the building is identical in size. The rooms are hexagonal, with two sides external and therefore available for windows. The location of these walls, with the seats arranged as shown in plan, brings the light from the windows over the left shoulder of every pupil without permitting it to shine in the eyes of any pupil. This is the perfect condition for lighting. The classrooms encourage teachers to seek other than rigidly rectangular seat arrangements.

The walls of classrooms, whether the rooms are regular in shape or not, are fully occupied up to 7 ft. high. The window-wall provides no usable space between windows. Even if windows are not close together, wall space between them is difficult to see. The teacher's wall is none too extended to carry her blackboard and a bookcase and wardrobe unit. The other walls must provide for additional blackboard and for pupils' wardrobe accommodation. The latter has been studied to a finish and compressed into a space 2 ft. deep, about 12 ft. wide, and 6 or 7 ft. high. It is considered necessary to provide doors to enclose this space. These doors are hinged to open any way but out, so as not to be in the way when children are using the ward-

[1]Member of firm of Kilham, Hopkins & Greeley, Architects, Boston, Mass.



The Thomas Willett School, Attleborough, Massachusetts, follows the contour of an odd shaped site. The departures from the conventional classroom and building shapes have been found useful.

robe. They are expensive and are hung on expensive hardware. They are commonly left open, exposing the clothing to view, and yet few school authorities are willing to leave them off entirely, even at a considerable saving and where money is scarce.

The floor of the classroom is proverbially of wood, because desks and chairs have generally been screwed down. Emancipation is going on constantly, so that more and more rooms are furnished with movable furniture, and can therefore have floors of cleaner and less combustible material than wood.

The ceilings of classrooms are supposed to be smooth to prevent shadows and the consequent cutting down of light. Beams that extend below the ceiling line are objectionable on that account.

In public schools generally, rooms are used between 8 a.m. and 3:30 p.m. Between these hours light is nearly always sufficient for reading. Nevertheless it is customary to provide electric lighting ample for night use. The question as to what is ample is a hard one to answer. Commercial enterprise has brought about among school authorities and parents a demand for more and more light. Laboratory tests have been quoted as indicating that sight may be injured by insufficient illumination. "Don't read in the dark. You will ruin your eyes!" In a recent case in which we were employed as architects, members of the school board rushed into print declaring in the local paper that our classrooms were designed to give insufficient light and that eye troubles, if not blindness, would result. In answering these criticisms we consulted able physicians expert in the field of eye hygiene, and submitted the following notes:

Consumer's Research Bulletin, January, 1936, reports that the International Commission on Illumination has set 5 foot-candles as the minimum on pupils' desks, and 6 to 12 candles as a value "which assures human welfare and is justified by economic considerations." Dr. Leonard Troland, of Harvard, says that the vast majority of industrial operations can be carried out at maximum efficiency with 10 foot-candles. Dr. Miles A. Tinker, of University of Minnesota, writes: "For all but abnormal eyes and the reading of illegible print 10 to 15 foot-candles furnish an ample margin of safety in brightness of illumination."

A study of metabolism and pulse rate as related to reading under high and low levels of illumination, by Ross A. McFarland, Charles A. Knehr, and Conrad Bereus, discovers no basis of truth in the commercial claims.

In "Illumination Standards for Effective and Comfortable Vision" (1939), Dr. Tinker concludes that 10 foot-candles is perfect for good eyes and that for defective eyes 20 to 25 foot-candles are required." The same doctor in "Hygienic Lighting in the Home" (1938), asserts that "from the standpoint of economy and hygiene of vision there is nothing to be gained from increasing the brightness of light beyond the point that yields comfortable and healthful vision during visual work such as reading, sewing and the like."

In Dr. Tinker's study of 1939 of "The Effect of Illumination Intensities upon Speed of Perception and upon Fatigue in Reading," this statement occurs: "Speed of reading is not increased and clearness of seeing (fatigue) after two hours' reading is not significantly changed when the

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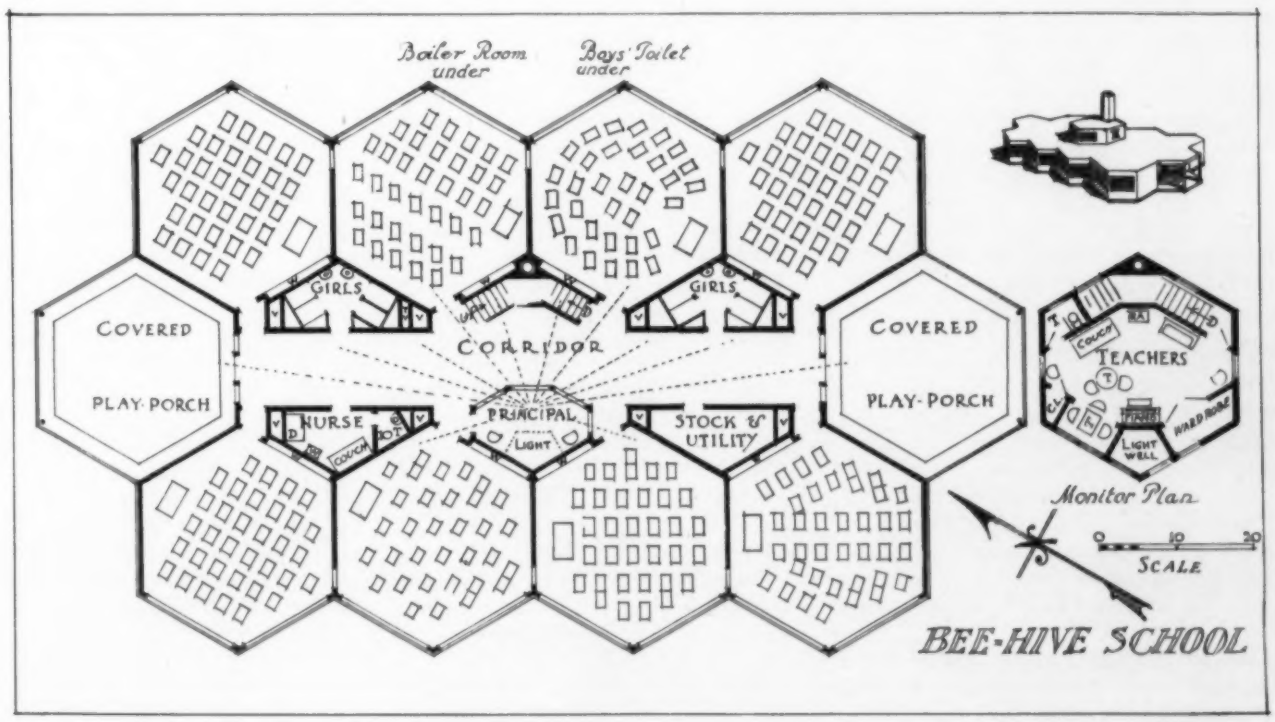

The Bee-Hive School may appear odd, but it has many practical elements for good lighting, efficient administration, and progressive instruction.

The Case of "Functional" Planning

H. W. Schmidt[1]

"But, Mr. Schmidt, I don't get the point. I don't see what is so unusual about this school-building plan. I've studied it rather carefully and for the life of me, I don't see that it is different from other plans I have checked, and that goes by the hundreds, and yet the designer has designated this as *exceptionally functional*. Maybe I'm just dumb, but I don't get the point."

"Let me take a look at that 'exceptional' plan, Al, maybe you've overlooked something that *is* exceptional," I replied.

After a 10-minute study I was forced to say: "Well, Al, you have me there. I can't see anything unusual about this plan, and as a matter of observation I have quite a number of criticisms in mind on the basis of the functionalism of which the designer seems to be inordinately proud, at least according to his statements."

"The only thing I can see, Mr. Schmidt, which is a little out of the ordinary," said Al, "is the large storeroom for stage scenery, really accessible in this case, and the good size dressing rooms with even toilet facilities. And that *is* unusual; evidently they expect to have a lot of dramatics in this school."

And by the way, Al — who is my assistant — knows his plans, as we both have checked literally hundreds of them and believe we both know the good features and shortcomings of school-building planning.

And in this manner was started the whole discussion of this business of "functionalism" and definitions, and accordance with them, and how best to meet the various situations, and what is there unusual about the terms, and . . . "so far into the night." So we dug ourselves into the trenches of ignorance (we could not conduct a blitzkrieg), and brought up our reinforcements in terms of previous knowledge, a few heavy tanks of educational theory, and some pursuit planes of ideas, and went forth to do battle with the insidious enemy carefully camouflaged by the plan referred to previously. Whether we overcame the strategy of the enemy and conquered him, the reader will have to judge. Excuse the warlike terminology but that is simply an outgrowth of the "war" we waged at the time.

What Is Functionalism?

Naturally, the first thing that came up was, What is a function, and what is meant by functional? But everyone knows those meanings, one hears it said, so why worry about that. Well, you try *your* definitions "on the piano" and see how *they* sound. So the faithful Noah Webster was consulted and we find that function, among other things is, "the activity appropriate to any business or profession; official duty." If you don't like these, there is, "any quality, trait, or fact so related to another that is dependent upon and varies with the other," to fall back upon. And the adjective is considered as, "designed, developed, considered, etc., with reference to a function or to functioning." If now we throw all these into the hopper and add a few comments, we shall probably grind out something like this: Functionalism is the doctrine of doing (designing) something which will meet or serve to best advantage a given situation or conditions and which is related to them in a definite and appropriate manner.

Of course, you can't expect a grinder to deliver a finished product, but it usually does emit something which may be used fundamentally and so we will use the above as our TNT in routing one of our enemies, "just planning." We will admit, however, that past "warfare" has diminished this particular enemy due to similar ammunition, to carry out our previous simile, but there are plenty left to be decimated.

At this point let us not become unduly critical about the whole matter of functional planning but rather study the implications of the terminology, analyze the factors involved, and possibly develop some ideas which may be helpful. It would seem desirable to determine what the designer is to "meet or serve to best advantage."

Important Factors

And right here one is confronted with a series of factors whose number is appalling to the uninitiate and is not too frequently appreciated even by the cognoscenti. Usually we use a by-pass or even an "overpass," not to pun too much, and blithely say we plan for, "a modern education" or "to meet the needs of our educational system" or "to serve local needs," or "plan in line with accepted practice," or "to meet special needs," or . . . but why continue. But rarely do we put into black and white *what* are the actual *needs* of our modern education, or what is our educational system or accepted practice or local needs, those needs which are fundamental to schoolhouse planning. Have you ever sat down and tried to make a list? Have you ever *seen* a list which seemed to be fairly adequate and to encompass the features which need to be considered so that the activity (planning) shall be, "appropriate to the business" (of education)?

Yes, we have seen "lists" but none which measured up to the above, and we ourselves have attempted to make up a list but found the hours in the day were limited and we failed to make a *comprehensive* and *defensible* list with which we were satisfied. We just quit and hurdled from one high over to another until we were exhausted. But at that, though we were not first in the race, we did not knock over as many hurdles as a good many of our fellow "hurlers," and the functional elements to be served resulted in a good building plan as measured by concensus of opinion, whatever that was worth.

Some Ideas

But let us see if we can develop some specific ideas of what this job of functional planning really comprises; it will be admitted that we are now going into a skimming process and will not commit ourselves to a complete analysis. But at that it may help — some may simply consider it amusing.

In the first place we need to know what educational philosophy we are going to serve, not easily answered, but fundamental. If you have no philosophy what kind of a "school" are you planning for: a progressive, an activity, an orthodox, or a platoon school, or "just a school"? We are not referring to a primary or elementary or secondary or vocational school or junior college, etc., as these are purely elementary factors, but we mean the more subjective features, psychologically fundamental to any school program. But we say, even if we plan along the lines indicated, changes in our thinking and in our social setup are so rapid and unforeseen that we do not know what *is* coming. How can we plan, except for serving to the best advantage what we now have or definitely know we will have? Very likely one has to pick out those elements which he believes will be defensible for a fairly long period based upon research or studies vital to this viewpoint.

But immediately, this compromise throws the whole matter into the subjective field and practically, aside from those factors upon which we can agree (and they are becoming somewhat rarefied), the fundamentals of functional planning may become a one man's job, better the work of a local group. One hopes it will be that of a group because it is doubted if any one man is able to grasp all of the elements involved. In many cases such results are very gratifying but there are plenty of evidences that someone has played with or upon the terms used herein; and don't forget that hobbies are not easily discarded.

Grouping of Functions

What are some of the other fundamentals of functional planning, aside from those just discussed? Possibly we can set up groups of the more material and rational elements involved; at any rate let us try.

How about the health angle? We take it that safety is another. Then we have the material factors in connection with the school activities: the academic three R's, social science, science, commercial subjects, art, music, shopwork, home economics, visual education, the radio activities, dramatics, etc. How many of these are existent in the school plant and what are the characteristic features of each subject which must or should be treated functionally, aside from pure space requirements? Some features are common to all or most: e.g., lighting, heating, ventilation, acoustical treatment, facilities for storage of materials, library facilities, etc. But even with these the quantitative elements are variables depending upon local ideas and options, modified by study and the experience of others.

The influence of the school organization is

[1]Supervisor of School Building Service, Wisconsin State Department of Public Instruction, Madison.

important, the philosophy of instruction (education) is important, the extent and scope of the "special activities" are important, the "impress" of the school administrator (his ideas, idiosyncrasies, pet subjects, or educational hobbies, etc.) is important and, last but by no means least, the funds available are of prime importance. One would like to see a utopian situation arise where there are no limitations of any kind involved except those indicated by sound judgment (which, of course, is about as important and subjective as any factor in a program) and see what genius will bring forth in terms of a "functional school plant." It is understood that there are a few such in existence, of late, at least according to the claims made for them, but evidently our "editorial we" have not seen them or did not recognize them or some other equally valid reason prevented.

One other factor in our functionalism has not yet been mentioned and that is the aesthetic. Is that a function of our education; is beauty, even if it is not blatantly objective, an element desirable, nay, even necessary in our planning? Is the educational process furthered by a beautiful environment? Can we develop the emotional element of our school children in desirable directions by using such an environment as an indirect influence along this line? Is the appreciation of material beauty an asset or a liability; is it a functional factor in our mental development? If one does not know the answers, the psychologists can give them to you.

Influence of Functionalism

How much of our so-called functional planning has contributed to the above element? How many designers have or had this line of thought definitely in mind when planning their schools? A good many, to judge by a study of plans, and many more in terms of the printed word. "The beautiful and chaste lines of the building . . ." "The library is exceptionally good in its treatment . . ." "and the assembly hall is very homelike and functional in its design," to cite but a few examples. But what are the facts? The chaste lines are those of a factory appearance with 186 ft. of steel sash; the library is an enlarged classroom with side bookshelves and a linoleum floor, and the assembly hall is a bare room — and we mean bare — devoid of any treatment except ashlar patterned walls and seated with long plain benches. Maybe, like Al, one claims to be just dumb and thus miss the implications of the statements, but it looks more as if there is a lack of "functions." Ho hum — maybe we have gotten off on the wrong foot, or gotten out of bed on the wrong side this day, so we'll drop this phase of the discussion.

May one mention that the unusual in school planning is not necessarily contributing to the functional idea, though we do hear the term used as a "talking point," as the commercial man uses it, to sell a particular design to the educational public. The activity room or alcove in connection with elementary schoolrooms is neither new nor unusual, but is it not a functional element if not used to "serve to best advantage a given situation . . ." when the "situation" does not exist. We have in mind a building with six such rooms where five activity areas are used as storage spaces.

Evidently we are also at loggerheads with some cherished ideas of health held to in the past when classrooms are designed with 9-ft. ceilings in order to give a homelike atmosphere to the room as part of the functional planning. *O tempora, O mores.* Then we have the stage in a recently erected auditorium which "has been planned to serve not only the school but to function as well for the community's dramatic work." One would suspect that "function" would mean what the word connotes in the fullest sense. But somebody slipped either in the statements or in the design. Oh yes, there are a large lobby and ticket booth and rest rooms, but the dressing rooms are laughably small. There is no access door for scenery, in fact could not be as laid out; there are no provisions for scenery storage or for properties, and the switchboard, such as it is, is on the wrong side of the stage. The actors, if there are any number, would have to while away time for their cues in the auditorium.

Not Too Critical

Then to fill our measure to overflowing one may cite a "functional" plan for some 900 high school pupils, and an appropriate number of teachers, with no provisions whatever for the teachers, their work preparation or conferences. One hardly expects them to do this work in the small rest rooms. Is this matter one of functional planning or not? Does such a situation contribute to the educational efficiency or not? And, by the way, there was no provision for a health program and it must be conceded that this is certainly a function of the school — not even an "emergency" room is in evidence. But the rest of the plan is in line with the functional idea, that is admitted. Was this planning one of compromise?

But one need not be hypercritical to see that in many cases the subject of functionalism is apparently not always understood and its involvements appreciated, and too often it serves as a catch phrase, like air conditioning, which is another phrase bandied about and usually does not cover air conditioning at all. The multiplicity of conditions met and to be catered to can now be appreciated and one would rather see a plan developed to be as functional as conditions and circumstances permit and not leave anyone in the belief that an omnibus condition has been met to the fullest. However, it is a great word to conjure with — *functionalism!*

As one last thought on this subject, one would like to ask the academic question, "When has a school-building plan been developed which is not functional?" The answer to this lies in the interpretation of the last word. In a loose sense no school building has ever been erected which does not, "serve . . . a situation or condition. . . ." But how far and to what "advantage" and how "appropriate" — aye, there's the rub. So after all and in the final analysis the functionalism, practically, is one of degree. We must face the fact that perfection may not be obtained in functional planning for reasons which are perfectly obvious and need not be discussed here.

And finally, in the writer's humble opinion, *the term functional planning has had a most important and far-reaching effect, both direct and by implication — it calls definite attention to the whole subject of proper and appropriate interrelations between the educational process and the physical environment and the material means provided.* And may it also be said that very often the latter two condition the educational process. On these bases, the term is a justifiable and appropriate and useful term. *May it be used as suggested!* And that is all that needs to be said on this subject at this time.

American Association of School Administrators Plan Meet in San Francisco

The American Association of School Administrators will hold its seventy-second annual convention in San Francisco, from February 21 to 26.

The general theme of the convention will be "Education for a Free People." The general sessions will be devoted to education and government, morale building, good neighbor program, education and reconstruction, and education for a free people. Another subject to be discussed in the sessions will be "The School's Responsibility for Improving the Health and Physical Fitness of the American People."

The sessions on Monday morning will take up the topic, "Education and Government," with Mr. Edmund E. Day, of Ithaca, N. Y., Prof. George D. Strayer, of Columbia University, and Dr. Alexander J. Stoddard, of Philadelphia, as the speakers.

At the general session on Morale Building, Sir Gerald Campbell, of the British Information Service in New York, will speak.

Mrs. Willie Snow Ethridge, of Louisville, Ky., will be one of the speakers at the general session on the Yearbook, which carries the title, "Health in Schools."

At the session on America and the Far East, Chih-Tsing Feng, consul-general of China, will be one of the speakers. Another speaker will be General Lewis B. Hershey, Washington, D. C., who will appear on the program devoted to the topic, "America's Destiny."

Thirty-three discussion groups on Problems of School Administrators will feature the afternoon programs. There will also be a series of study groups on Health and Safety Education. Other topics to be discussed are Civic Education for Adults, School Forums, and Adjustment of Rural Schools to Present Needs.

The several problems of school administration, including those related to equipment and supplies, supervision in relation to administration, financing of schools, and evaluation and selection of textbooks will be discussed.

The impact of the present crisis on education will be studied in conferences which will take up the topics: School Problems in Defense-Boom Cities, Pan-American Relations, and The Education Program for Men Returning from Military Service. Other topics to be taken up are: Opportunities for Gifted Children, Integration of Vocational Education with General Education, Radio in Education, Vocational Education for Girls, and Guidance and Occupational Adjustment.

Main front of the Whitefish public school has been beautifully landscaped with native trees so that the building is truly a beauty spot and a dignified community center. — Fred Brinkman, Architect, Kalispell, Montana.

The New Central School, Whitefish, Montana

As Mr. E. A. Hinderman, superintendent of the Whitefish public schools tells it, the story of the new Central School of Whitefish, Mont., is only a little short of romantic.

The original school setup consisted of three small unconnected buildings which provided facilities for both elementary and high school students. The first and second floors of the mid-plant housed the intermediate grades; a hundred high school students occupied the third floor. This building, the largest of the three, was flanked on the right by a small, primary grade building and on the left by a rather "boxy" gymnasium. In 1920 the central building was enlarged by the addition of a rear wing.

In a few years the high school occupied the two upper stories of the central building. Shortly a junior high school was created and located in the lower floor of the gymnasium which was partitioned off into classrooms.

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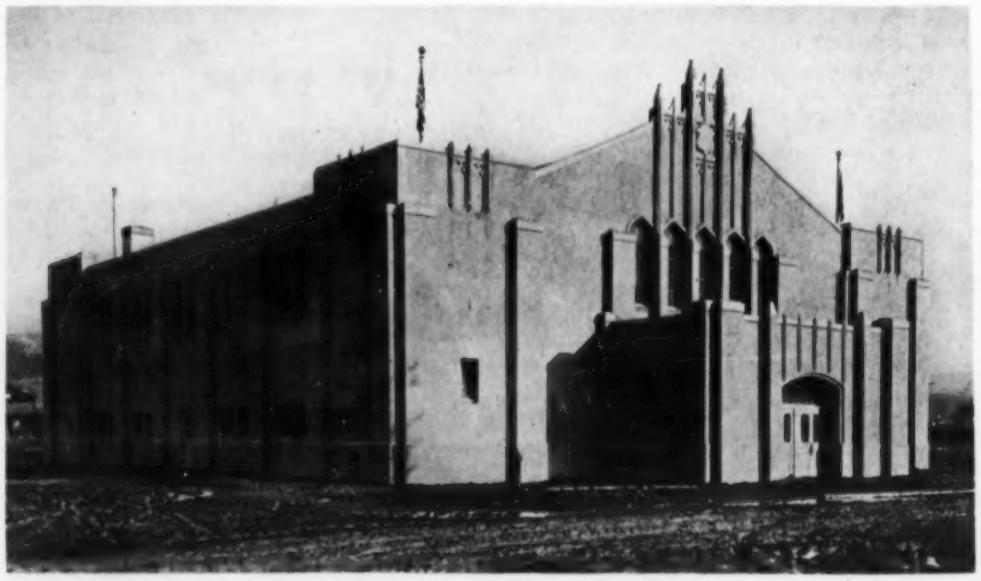
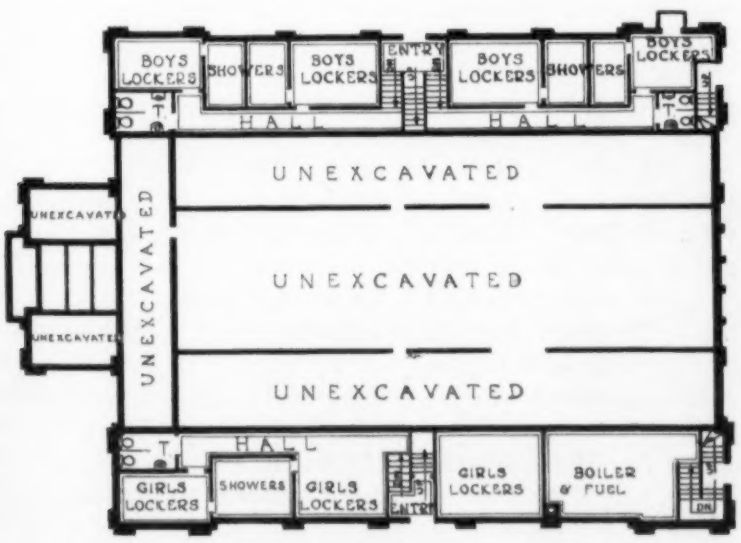
While the new school was being erected, the pupils occupied four passenger coaches supplied by the Great Northern railroad. These were comfortable, warm, and well lighted.



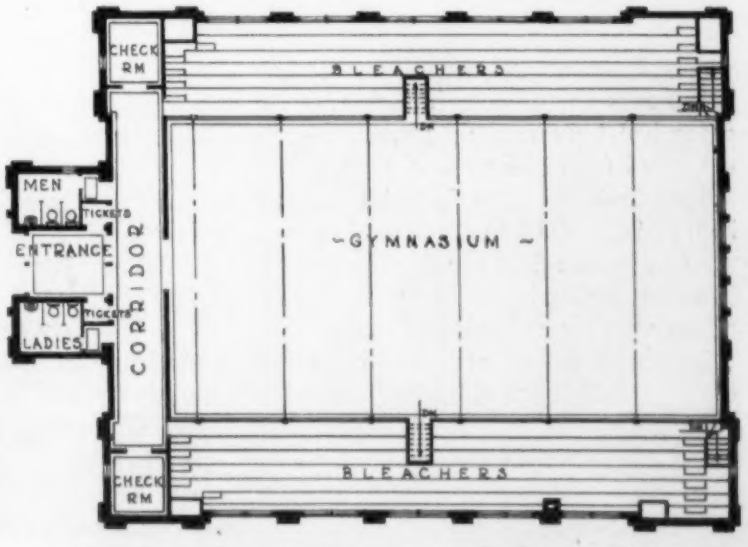
The Whitefish public school gymnasium is constructed of monolithic concrete and is thoroughly fireproof.

Floor Plans, Whitefish School, Whitefish, Montana. — Fred Brinkman, Architect, Kalispell, Montana.

The athletic field adjoining the gymnasium is adequate for baseball and football and for track meets. It is regularly used for school and community play.



Basement Plan, Gymnasium, Whitefish, Montana.



First-Floor Plan, Gymnasium, Whitefish, Montana.

THE AMERICAN
School Board Journal
Edited by Wm. Geo. Bruce and Wm. C. Bruce

The Continuing Need

THE education of American children for the democratic way of life is an enterprise of greater importance in wartime than in peace. Viewed solely from the standpoint of the protection of American life and institutions, the operation of the schools under physical and plant conditions which will assure every child of a seat and healthful, comfortable, and educationally adequate space in a safe school building is a primary essential in home defense.

All children will shortly be subjected to emotional and physical strains and to social upheavals that will make a lasting mark upon their characters, their physique, their capabilities to carry on during the war and during the years of peace to come when American democracy will assume a new place of leadership in the world. It will be a first duty of the schools to do what they possibly can to offset the harm of war. There can be no lasting peace, no high quality of democratic social life, no continuing advance of democracy if the schools fail in their task. It would seem to be an everlasting reflection on American foresight and sound planning ability if school-building construction were to be dropped for the duration of the war. The lessons of the last war and the disastrous effect of the suspension of school-building programs from 1917 to 1919 and even 1920 are still clear in the consciousness of school executives. That lesson should be heeded not only in cities where sudden increases in population are making serious shortages felt; it should be universally heeded.

The paper of Architect Hacker on another page of this issue suggests a practical means of constructing schoolhouses that will require a minimum of time, materials, and funds, and will be salvageable when after-war shifts develop.

The problem of getting materials for schoolhouse construction may be aggravated somewhat as the year progresses. For vocational schools and for schools in war industries and army-and-navy-camp communities high priority ratings will enable the boards of education and their contractors to secure practically any needed articles except heavy steel instructional parts and copper and aluminum units.

The lack of some materials will be a challenge rather than a hindrance to the construction of fully adequate, safe, and economical buildings. In a single New England schoolhouse contracted for in December, 1941, a reduction of 92 tons in steel was effected by redesigning the auditorium, the gymnasium, and the stairs to eliminate heavy steel; by changing the type of concrete floor construction, and by eliminating metals from certain exterior places. It is expected that an economical and satisfactory building will result.

The entire job of planning and constructing new schoolhouses in 1942 is one of actively studying the entire situation. It will be most helpful to plan the buildings for the broadest educational and community use so that the growing wartime activities of adults and children can be fully met. This social and community planning for war can be fully utilized for later peacetime activities.

Whatever sacrifices communities bring for the home defense will make the war years easier and the peace years more lasting.

A Supreme Test for the Schools

THE schools of the nation have an important part to play in the successful prosecution of the war so that ultimate victory will be achieved by our armed forces who are valiantly fighting the hordes of totalitarianism and destruction. In a very real sense the schools are a first line of home defense and their efficiency must not only be maintained; they must undertake new duties which the times impose upon the citizens generally and upon so important an agency of governmental service as education.

The schools are responsible for the unimpaired instruction of all the children of all the people, and for the maintenance of morale among the most impressionable portion of the population, the small children, and the youth. The schools are responsible, too, for the maintenance of the mental hygiene of children and for their health in important aspects. In many communities — pray God these may be few — the schools will be responsible for the care of children during times of aerial bombardment and air attacks. For these, home-escort exercises, emergency fire and bombing drills, and other air-raid precautions will be inevitable.

If it is understood that it requires 14 men in industry, transportation, etc., to keep one soldier effectively equipped to fight, then the growing duty of the schools to train mechanics and workers generally for the war industries may be appreciated. This vocational education of youth and of adults must extend beyond the vocational schools in the larger centers, all of which are already operating at capacity and for 24 hours daily. It seems essential that the defense program reach into all small communities where the school farm shops and the small high schools have the simple equipment for training lathe operators, sheet-metal workers, and a growing variety of workers needed in war-materials factories. It may be necessary to conduct schools on Saturdays in order that terms be shortened and boys be released for summer work on farms, etc.

It is the duty of every board of education and of every school executive to begin immediately plans for the participation of the schools in an active, vigorous way, in all elements of home defense and in the participation of the children in all war activities which we at home must carry on until victory is won. What more the schools can and should do for the safety, the comfort, the mental calm, and the true welfare of the children will become apparent as the pattern of the respective campaigns on land and sea unfold.

Perhaps the check list below, prepared in New York City, will help school executives and boards of education to examine their official consciences and to develop both the organization and activities for school civilian defense.

Has a survey been made of the staff's special abilities in the fields of community relations, first aid, mental hygiene, welfare work, and so forth?

Has a thorough study been made of the community agencies whose efforts should be co-ordinated with those of the school?

Has an address catalogue (of pupils) been prepared?

Has a spot map been prepared showing the residence of pupils in attendance at the school?

Have personal contacts been established with the key per-

sons in charge of the more important community agencies, public and private?

Have the physical facilities of the school been carefully studied in conjunction with the custodian engineer?

Have plans been submitted to the superintendent for housing children in school and for dismissals in time of emergency?

Have maps been prepared showing the provisions made for housing children and for the dismissal drills?

Has the topic of panic prevention in emergencies been discussed with the school staff? With representative parent?

Have proposals been drafted to assure positive morale among children and adults during trying times?

Has a definite attempt been made to interest teachers in in-service courses designed to step up the efficiency of civilian defense?

Has a program been evolved for interpreting and indoctrinating the basic principles of democracy?

Has some thought been given to the extension of the school's efforts in the direction of an adult education program?

In secondary schools, has an effort been made to stress the civilian defense implications of the work carried on in classroom, laboratory, and shop?

The educator may very well put into action the point of schoolmen in 1917 and 1918 who said: "The children are the seed corn of the Nation; do not grind your seed corn."

Rockford Reopens Schools

THE disastrous tax situation which struck the public schools of the City of Rockford, Illinois, and caused the board of education to order the closing of the schools from November 7 until Christmas, has been solved by an increase in the educational tax rate from $1.50 to $2.

It required considerable courage on the part of the school executive and of the board of education to bring the problem to a head and to actually compel the community to realize the serious plight of the schools. The board of education not only acted promptly and summarily, but caused the selection of a citizens' committee which carried on a vigorous tax-increase campaign, resulting in a successful referendum vote which was carried in every ward of the city by a two-to-one vote.

The victory of the Rockford schools is particularly significant because there is in the community, like in so many other cities in the Middle West, a heedless reaction on the part of real estate owners and others for a reduction in the local taxes during the war.

State Audits of School-Board Books

THE board of education at Nevada, Mo., has recently recommended in its annual report, that the state of Missouri establish an auditor's office in the state school department, and that the books of all boards of education in the state be given a professional audit once a year.

The suggestion is a valuable one and indicates a type of service from which most boards of education, particularly in small cities, would benefit. Such audits would not merely discover discrepancies in the actual account keeping of the school districts and possible shortages in school funds; they would serve the purpose of unifying all the schools accounting of the state and of causing all the districts to keep their records in a form that would be accurate in the interpretation of accounting facts and in the reporting of educational expenditures. A more important advantage would be the guidance of local school authorities in budgeting and in the general conduct of the school districts business.

There is, of course, a danger involved in that a state accounting and auditing office would become bureaucratic and interfere with local school independence, unless legislation were enacted to thoroughly safeguard independence in the local school system.

While similar auditing offices in such states as Indiana and Ohio have not been unmixed blessings, they have obviated endless abuses and evils which are found particularly in the middle west where the innumerable local districts are more or less independent of control from the outside, and lack adequate state control. It is not an exaggeration to say that numerous school districts in Illinois, Wisconsin, the Dakotas, and other states are bankrupt in the ordinary business sense, and that they have enormous concealed or semiconcealed debts that some day will cause trouble and annoyance.

A proper state auditing program, if conducted under the supervision of a state department of education, would not only raise the general level of school accounting, but ultimately would make clear to the state legislatures the evils of the antiquated small-district system which was unavoidable during the pioneer period of the United States but which outlived its usefulness several generations ago.

The Naming of Schoolhouses

AN INTERESTING controversy on the naming of a new school building or the renaming of an older building usually arises, when the decision lies between the name of a great name in American history and a local personage.

Most of the school buildings that have been dignified with a name have exalted American statesmanship. The memory of the great founders of the Republic, of the several presidents, and of the military heroes of the nation has been honored.

Here and there, there has been a tendency to honor the memory of a local individual whose contribution to the cause of the schools has been distinctive and memorable. Thus, we find a new schoolhouse named in memory of a schoolmistress who devoted a half century of her life to the training of children, a member of a board of education who served a long term of years loyally and efficiently, a school superintendent who gave the best years of his life to a school system. Likewise, the memory of school principals who rendered a remarkable service has been honored.

And why not? If exemplary lives are to be brought to the youth, lives that carry with them a lesson in loyalty to a task, an honorable career, and a beneficient service to mankind, then the man or woman who once lived and labored where the boys and the girls of today now live and labor, may carry an effective and significant lesson.

New Preference Ratings

SCHOOL boards should obtain and use the newest Preference Rating Order issued by the OPM in December, 1941. The new preferences permitted for the purchase of materials and supplies for public school maintenance and repairs is designated as P–100.

Some Factors Favoring the Passage of School Bond Issues

R. W. Edmiston[1] and James R. Holcomb[2]

Whether the school-board member or the school executive believes in emotional appeal or a clear presentation of facts to gain public support for the passage of school bond issues, he should realize the influence of certain factors effecting public approval or disapproval. Thus, these five questions appear pertinent: (1) Were school bond issues which passed more highly publicized in the newspapers than those which failed? (2) What types of newspaper publicity were particularly effective or uneffective? (3) How effective was newspaper publicity used to defeat school bond issues? (4) Were issues passed upon repeated submission accompanied by more extensive newspaper publicity (5) How is the passage of school bond issues affected by other current bond issues and by the time of presentation?

Five Types of Effective Publicity Discovered

The following answers were obtained from data gathered through a consideration of the school bond issues presented in 1937–39 in Ohio cities whose daily papers were catalogued at the Ohio Museum.

Thirty-eight bond issues were studied of which 25 passed and 13 failed. The amounts of publicity were measured in column inches. The five main types of effective publicity were found to be news, pictures or drawings, editorials, open letters, and paid advertising, with too few examples of graphs, cartoons, and articles for study. Passing issues had an average of 353 column inches of favorable publicity and failing issues, an average of 218.

To determine the effectiveness of various types of newspaper publicity, the amounts of both favorable and unfavorable publicity were considered. When used, editorials provided 13 per cent of the favorable publicity for passing and 11 per cent for failing issues. Editorial support is the only favorable publicity without which no issue passed. All drawings and pictures were favorable and amounted to 12 per cent of the publicity where issues passed and 6 per cent where issues failed. While the per cents of column inches of news used with passing and failing issues were approximately the same, four of five issues with unfavorable news failed.

Paid advertising was extensively used and made up 40 per cent of the favorable advertising when issues using paid advertising passed and 42 per cent when such issues failed. While these facts seemed to imply less effectiveness for paid advertising than for other types, issues opposed by paid advertising failed.

The open letter was used less frequently than the above types of publicity and less effective. When used, the issues which passed showed that open letters constituted only 9 per cent of the favorable publicity while like issues which failed had open letter publicity amounting to 11 per cent. Furthermore, two of the three issues which passed with opposing publicity were opposed by open letters.

Graphs were used in two instances and both issues failed, articles in two of which one failed, and cartoons in four of which two were unsuccessful.

Adverse publicity was found to be very effective. In no instance did a school bond pass when there was much opposition in the newspaper. Only three of the 13 successful issues had newspaper opposition and this was of small amount. In fact, more than 12 adverse column inches were fatal. Only two of the 12 issues which failed with adverse publicity received an amount equal to or greater than the favorable publicity.

An increase of favorable newspaper publicity was ordinarily accompanied by an increase of favorable votes upon resubmission of school bond issues. The exceptions were the cities of Hamilton and Wooster. Hamilton was disregarded since an election official was convicted and sentenced for altering the school bond ballots at the general election. The increase at Wooster was in the form of paid advertising and news, with a decrease in editorials and cartoons. The increase in paid advertising was more than the total increase in publicity. It was to be expected that an increase in a less effective type of publicity, paid advertising, would not overcome a decrease in the more valuable editorials.

Other bond issues and the time of presentation were likewise important. School bond issues, when accompanied by more than one other issue, did not pass. Three of the 19 cities with other bond issues before the voters carried their school bond issues, while 10 of the 19 without other issues carried.

Special Elections Best for Bond Issues

Comparisons of the success of school bond issues presented at primary, special, and general elections showed that seven of twenty, or 35 per cent, carried at the primary; five of seven, or 71 per cent, at the special; and one of eleven, or 9 per cent, at the general election in November. These per cents of bond issues passed were in the same order as the average column inches of newspaper publicity: an average of 336 column inches for issues at special elections, where 71 per cent passed, 308 at primary elections where 35 per cent succeeded, and 236 at general elections when only 9 per cent received a favorable vote.

The following general conclusions are indicated by the evidence presented:

1. The more newspaper publicity, the more likely the issue is to pass.
2. Editorials are the most effective type of newspaper publicity and editorial support is practically a necessity to the passing of a school bond issue.
3. It seems necessary to avoid adverse newspaper publicity. When this adverse publicity approached or equaled the favorable publicity, the issues failed.
4. More extensive newspaper publicity is an important factor if the issue is to succeed on resubmission.
5. Accompanying bond issues lessen the chance for passage of school bond issues. Other features of the primary and general elections act likewise. Therefore, the special election is favorable to the passage of school bond issues.

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[2]Public Schools, Hamilton, Ohio.

School Buildings for War Emergency

Ralph E. Hacker[1]

There is an old accepted saying that "history repeats itself." Countries suffer from history's tragic repetition, because its citizens lack the knowledge or discernment to recognize, or sufficient determination to avoid, past blunders under similar circumstances. The philosopher Santyana said, "Those who ignore the lessons of history are condemned to relive them."

Today this country faces a schoolhousing situation similar to that which confronted it in 1917 and 1918. Huge factories for the construction of war materials are being erected in areas remote from existing centers of population. In some instances workers can reach these factories by bus or automobile. In other locations mushroom towns rising in the vicinity of these factories create an unhoused school population.

After the last war, when the need for war materials ceased and the factories closed, the residents of these communities had no alternative but to abandon improvements and school buildings constructed at war prices and relocate them where employment was available. The inevitable result of unpaid taxes, defaulted bonds, and unsalable land and buildings meant financial chaos for these districts. So should the best thought and greatest endeavor be directed to prevent a recurrence of such situations in the present crisis.

The problems of priorities may be simplified, defense work expedited, and millions of dollars saved if, for this sporadic type of district and for communities in general during the period of national defense, new school buildings are designed and constructed of what may be termed the "Nuclear" type. Properly planned, the "Nuclear" building may readily be converted at a reasonable cost into a "permanent" building after the national emergency, or if the building is no longer needed, have a high salvage value.

A town or city with permanent industries and a mounting school enrollment, caused by a war boom, should be guided by the more or less permanent nature of the industries responsible for the increase. If the increased school population is not an excessive proportion of existing enrollments, the use of a permanent type of construction may be advisable, priorities permitting.

The advantages of the "Nuclear" type building are:

1. Elimination of many materials on the critical list and tremendous reduction in others, thus simplifying the problem of priority ratings.
2. A minimum expenditure at a time when cost of labor and material is high.
3. The possibility of converting the building to a permanent type at the expiration of the national emergency. Costs may then be lower and such conversion will assist in providing needed work to take up the slack at that time.

School buildings, whatever the type, should incorporate the following essential elements:

a) Provide adequately for educational needs; (*b*) safety and sanitation for the occupants; (*c*) adequate protection from weather; (*d*) ample natural and artificial light; (*e*) reasonably comfortable temperatures; (*f*) ventilation — natural or artificial; (*g*) minimum maintenance and operating costs; (*h*) low insurance rating; (*i*) minimum first cost.

In addition to meeting the above requirements the "Nuclear" type school should:

1) cost less than fifty per cent of the permanent type; (2) be capable of erection and occupancy in from 20 to 50 days after materials are at the site, according to weather conditions and size of the building; (3) have a high ultimate salvage value when no longer needed; (4) use a minimum amount of critical materials, labor, and equipment for erection; (5) be of fireproof construction preferably.

To plan a building meeting the above requirements requires not only a high degree of skill and ingenuity on the part of the school architect and a thorough knowledge of building construction, but a comprehensive knowledge of the building material market and the practical substitutes for the materials on the government's critical list.

No one type of construction is suitable for all localities or types of buildings. Earthquake areas and hurricane zones, climate, severe seasonal variation, site conditions, rainfall, the amount of funds and the kind of material and labor available for the project must one and all be considered, along with the factors previously referred to. Together, they govern the type of

(Continued on page 56)

[1]Hacker & Hacker, architects, Fort Lee, N. J., and New York City. Abstract of an address, National Association of Public School Business Officials, October 16, 1941.

HANDLE MORE PUPILS AT LOWER COST WITH PEABODY *Defense Line* SEATING!

Increases Seating Capacities of Class Rooms 20 Percent

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Without *Peabody's* Quotation You're Not Ready to Buy

(Continued from page 54)

construction to be used in school buildings erected during the period of the national emergency. Nor should the opinion of competent authorities be overlooked as to the possibility and effects of shell fire, bombing, or gas.

Buildings of the same type, size and construction will vary in cost with the local differential in labor rates and material costs, and climatic conditions.

A comparison of such cities as Los Angeles, Calif.; San Antonio, Tex.; Savannah, Ga.; and Mobile, Ala., with Eastport, Me.; Marquette, Mich.; Bismarck, N. Dak., and Havre, Mont., shows an average of 1417 degree days for the first group as compared with 8605 degree days for the second group, a difference of 609 per cent. The lowest temperature ever reported for Los Angeles is 28 deg. F. and —1 deg. F. for Mobile as compared with —23 deg. F. for Eastport to —57 deg. F. for Havre. The increased insulation and radiation and the larger piping, valves, traps, boilers, pumps required for the second group is reflected not only in a higher cost for the heating plant, but also in the general construction and plumbing work where the frost line requires lower levels for foundation walls and piping.

The accompanying small scale illustrations show various "Nuclear" units, starting in their simplest form, using the minimum amount of elemental materials as a base.

The building may be of fire resistive, semifire resistive, or wood construction. It may have any required number or size of special rooms, such as auditorium, gymnasium, etc. Materials, finishes, and mechanical services may be varied to meet specific needs within the limit of funds and kind of materials available. Spread over one-story buildings the constructions will cost less proportionately than if raised two or more stories.

Only a brief description of a few of the possible constructions can be given here. For the purposes of illustration a typical arrangement of two classrooms with corridor between is used. The method of handling pupils' wraps varies with the grades housed and the school organization. The method used affects the location and span of framing members and therefore the cost. Three methods of handling wraps are indicated on the plans: (1) room wardrobe, (2) cloakroom, and (3) provision in the corridor.

Framing the Buildings

The small illustrations show a few varied principles for "Nuclear" framing. Wall construction or columns as indicated on the drawings may be used to support the roof construction or a floor above. Plan 2 indicates six columns per classroom with two of these columns on the "Nuclear" axis, thus averaging four columns per classroom for multiple units. Plan 3 requires only two columns per classroom; Plan 4 requires four columns. Plan 1 shows two columns per classroom. As one column is on the "Nuclear" axis, only one truss and one column per classroom is required for multiple units. It may be seen how the selective use of framing contributes one of the economies of the "Nuclear" system.

Columns permit reduced wall thickness above and reduce quantities of excavation, backfill, wood or metal forms, and concrete foundation. The latter would average from .7 cu. yds. for one column to 4.2 cu. yds. for six columns. The concrete for wall-bearing foundations would average 11.1 cu. yds. per classroom with proportionate increases in the other items.

Skillful use of the cantilever principle will reduce the quantity of structural material for given spans and loads and entirely eliminate structural members in some locations.

For sections of the building with a center corridor, the cantilever truss shown for Plan 1 requires only the two points of support at the corridor walls and eliminates the lintel over windows in the exterior wall. The truss can be quickly constructed on the ground, raised into position, and cross braced. Trussed wood purlins at the panel points of the truss, support cantilevered rafters. For a two-story building, two columns and one lintel need to be added in the first-story exterior wall of each classroom.

This cantilever construction with two-point support is not only economical, but superior to most types for resistance to shock or earthquake tremors.

In Plans 3 and 4 cantilever lintels are shown over the exterior windows and a cantilever beam over the corridor columns of Plan 4. Plan 2 utilizes the trussed wood girder principle for the roof construction. Plan 3 uses for the roof framing long span-truss joists of steel or wood supported only from the exterior walls. If the time comes when the building is no longer needed for school purposes, the corridor walls can be removed and the building used for factory, garage, or other purpose. Steel trussed joists 30 inches in depth spaced 4 ft. apart will span over 56 ft. and cost approximately 50 cents a square foot, erected in the metropolitan area.

Roof Deck — Roofing

The spacing and size of purlins and rafters depends on the material selected for the roof deck. Plain or corrugated cement fiberboard, asphalt impregnated steel sheets, precast gypsum planks and boxed plywood panels using the stressed skin principle with or without built-in insulation, all permit fairly wide spacing of purlins or rafters.

Impregnated roofing felt and pitch or asphalt with or without slag or gravel may be used over plywood or roofers. Very little flashing is required with the constructions shown. What is needed may be leadcoated ternemetal or compo-

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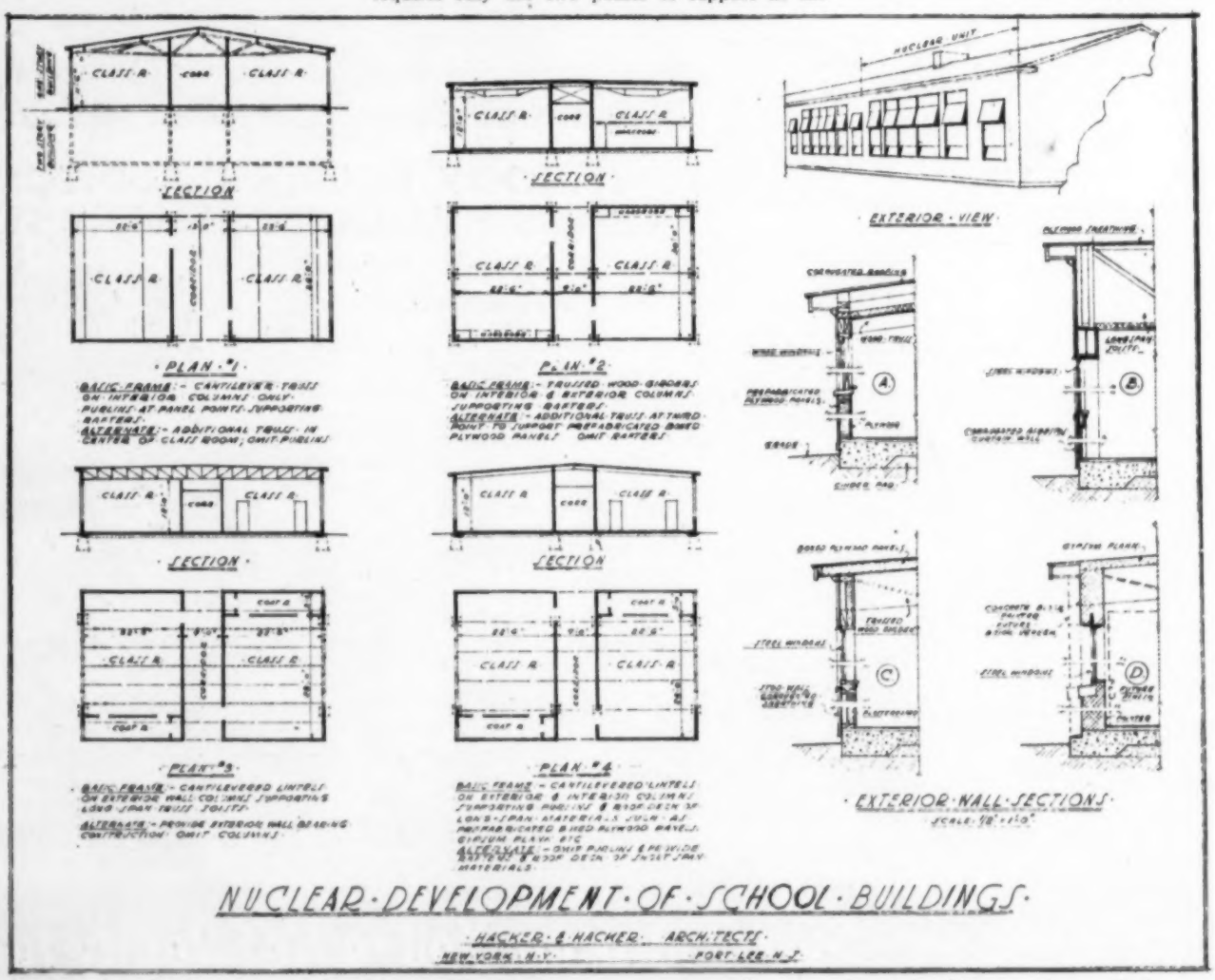
SECTION
CLASS R.
CORR.
PLAN "1"
BASIC FRAME:- CANTILEVER TRUSS ON INTERIOR COLUMNS ONLY- PURLINS AT PANEL POINTS SUPPORTING RAFTERS.
ALTERNATE:- ADDITIONAL TRUSS IN CENTER OF CLASS ROOM; OMIT PURLINS.
PLAN "2"
BASIC FRAME:- TRUSSED WOOD GIRDERS ON INTERIOR & EXTERIOR COLUMNS SUPPORTING RAFTERS.
ALTERNATE:- ADDITIONAL TRUSS AT THIRD POINT TO SUPPORT PREFABRICATED BOXED PLYWOOD PANELS OMIT RAFTERS.
PLAN "3"
BASIC FRAME:- CANTILEVERED LINTELS ON EXTERIOR WALL COLUMNS SUPPORTING LONG SPAN TRUSS JOISTS.
ALTERNATE:- PROVIDE EXTERIOR WALL BEARING CONSTRUCTION OMIT COLUMNS.
PLAN "4"
BASIC FRAME:- CANTILEVERED LINTELS ON EXTERIOR & INTERIOR COLUMNS SUPPORTING PURLINS & ROOF DECK OF LONG SPAN MATERIALS SUCH AS PREFABRICATED BOXED PLYWOOD PANELS GYPSUM PLANK ETC.
ALTERNATE:- OMIT PURLINS & PROVIDE BEARING WALLS FOR ROOF DECK OF SHORT SPAN MATERIALS
NUCLEAR UNIT
EXTERIOR VIEW
EXTERIOR WALL SECTIONS
SCALE: 1/8" = 1'-0"
NUCLEAR DEVELOPMENT OF SCHOOL BUILDINGS
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School Furniture

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KALAMAZOO ADOPTS SINGLE SALARY SCHEDULE

The board of education of Kalamazoo, Mich., has approved a new salary schedule for teachers, prepared by Supt. Loy Norrix. The schedule is based on two factors: (1) experience and (2) training, and provides for four basal salaries for teachers with no experience, as follows: teachers with two years of college training, $1,000; teachers with three years' training, $1,100; those with four years' training, $1,200; and those with five years' training, $1,300. A differential of $150 is allowed for men instructors. Credit for experience previous to appointment or reappointment is allowed at the rate of $50 per year, not to exceed five years.

Under the schedule, teachers with two years of training will begin at a minimum of $1,000, and will receive increases of $50, up to a maximum of $1,900 at the end of the sixteenth year. Teachers with three years of college training will begin at $1,100, and will be given increases of $50 up to the maximum of $2,000 at the end of the sixteenth year. Teachers with an A.B. degree will begin at $1,200, and will receive increases of $50, up to a maximum of $2,250 at the end of the eighteenth year. Teachers with an M.A. degree will begin at $1,300, and will receive increases of $50 up to a maximum of $2,350 at the end of the eighteenth year. The fifth, tenth, and fifteenth increments in the salary schedule provide increases of $100 each for teachers who do not possess a minimum of four years of college training as evidenced by the possession of a bachelor degree.

Teachers with four years of training and who hold the bachelor degree must present evidence of having earned at least six semester hours of credit in an accredited institution of higher learning during the previous five years. To be eligible to receive the fifth increment, a teacher must have secured at least six semester hours during the previous four years.

Teachers with five or more years of training and who hold the master's degree must produce evidence of professional growth, such as attendance at summer conferences, educational travel, educational research, publication of articles, outstanding work for civic improvement, or educational work in the improving of the curriculum. Such evidence of growth must be presented during the interim from the time of appointment and fifth increment, and between the tenth, and tenth and fifteenth, and must be approved by the board.

Teachers who may in the future receive an advanced degree, or those without a degree, who may produce evidence of having completed an additional year in college, must present such evidence on or before September 1. Salary adjustments will be made to place such teachers on the schedule according to years of training and experience. No increase may be given above the schedule for that particular classification.

NEW SALARY SCHEDULES AT NEW PHILADELPHIA, OHIO

The board of education of New Philadelphia, Ohio, has adopted a new salary schedule, based on length of experience and professional training of teachers. The schedule is applicable to all groups, including teachers, principals, and supervisors, and is to become effective September 1, 1942.

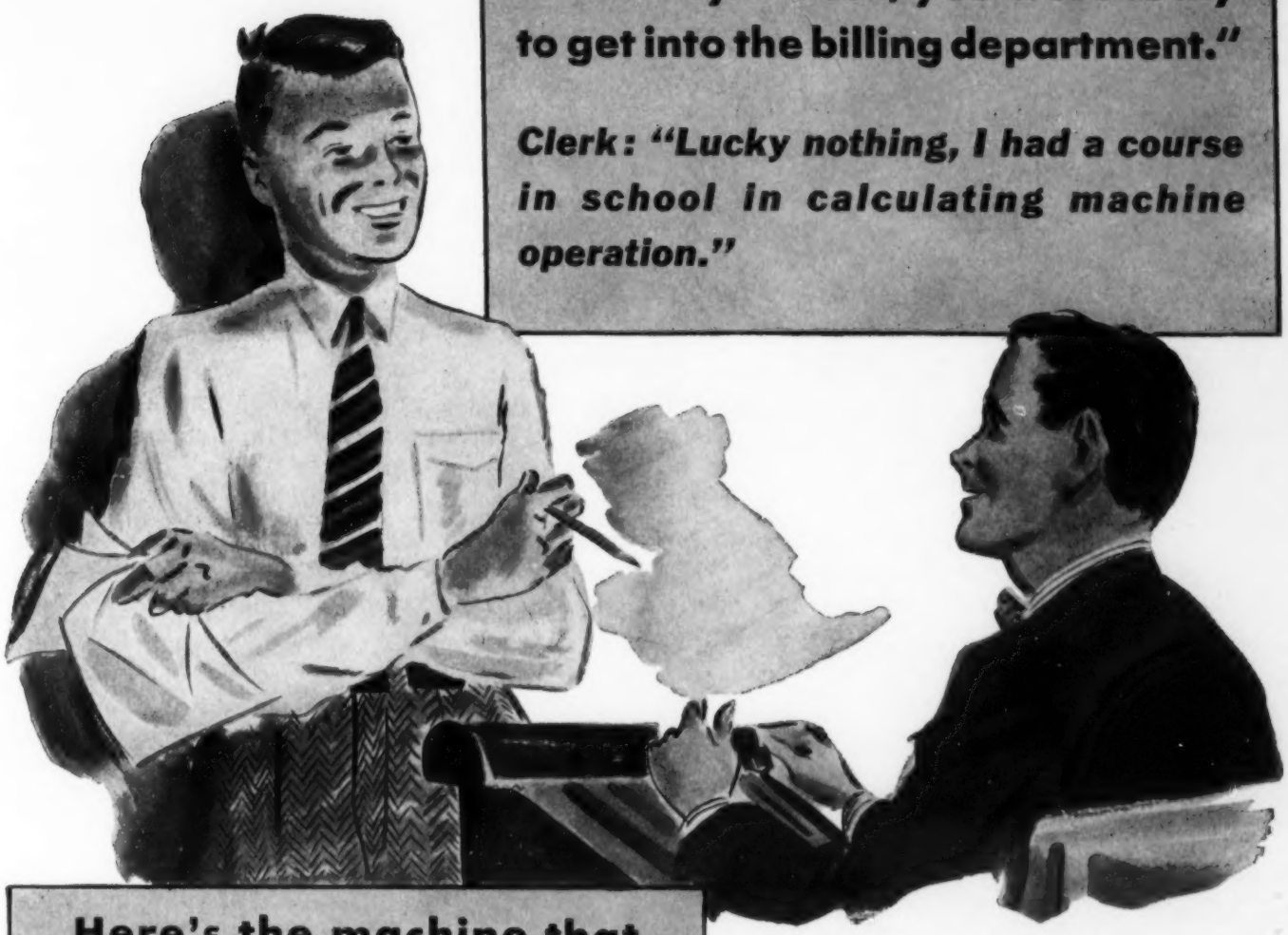
Under the schedule, teachers with two years' experience will begin at the minimum of $850 per year, and will advance $50 per year up to the twelfth year, when they will receive increases of $25 up to the final maximum of $1,500 at the end of the fifteenth year. Teachers with three years' training will start at $950 and will receive increases of $50 up to the twelfth year, when they will be given increases of $25 up to the final maximum of $1,600 at the end of the fifteenth year. Teachers with four years' experience will begin at $1,200, and will advance at $50 up to the tenth year, when they will be paid increases of $25 up to the final maximum of $1,900. Teachers with five years' training will begin at $1,300, and will advance at $50 up to the tenth year, when they will be given $25 per year up to the final maximum of $2,100 at the end of the nineteenth year.

Principals of the elementary schools will be compensated according to the size of the building for which they are responsible. All principals will be given extra compensation in addition to the regular salary provided in the schedule. The scale will start with $50 for a two-room building and work up to $180 for an eight-room building. For each additional room, $20 per year.

Elementary art and music teachers will be allowed compensation for transportation at the rate of 50 cents per day. The board, at its discretion, will allow additional compensation to coaches, assistant coaches, and to the faculty manager of athletics. The amount of the additional compensation is to be fixed by the board.

The board has adopted new regulations to govern the administration of the schedule:

1) The training of a teacher on the elementary level only will be recognized for salary increases of elementary teachers. (2) The possession of a bachelor's degree will be recognized as evidence of four years of training. (3) A master's degree will be recognized as evidence of five years of training. Thirty semester hours or 45 quarter hours of work on the graduate level, at an institution whose work on the graduate level is recognized, will be accepted in lieu of a master's degree as evidence of five years of training. (4) A master's degree or its equivalent in semester or quarter hours will not be recognized for elementary teachers. (5) Where the salary provided in the schedule is less than that at present paid a teacher, the higher salary will continue in force, until a change in the status of the teacher provides for a higher schedule according to the schedule. (6) Under the schedule, no teacher's salary may be increased more than $200 in any year, and none may be reduced below that to which she is entitled. Where a teacher's present salary is below that to which she is entitled, her salary may be increased at the rate of $200 per year until the salary to which she is entitled is reached. (7) Salaries on the schedule will be paid on a 12 months' basis. (8) The schedule applies only to employees in the certified teaching service. Salaries for services other than teaching and custodial work will be determined by agreement between the persons rendering the service and the board.


Office Boy: "Gosh, you were lucky to get into the billing department."
Clerk: "Lucky nothing, I had a course in school in calculating machine operation."

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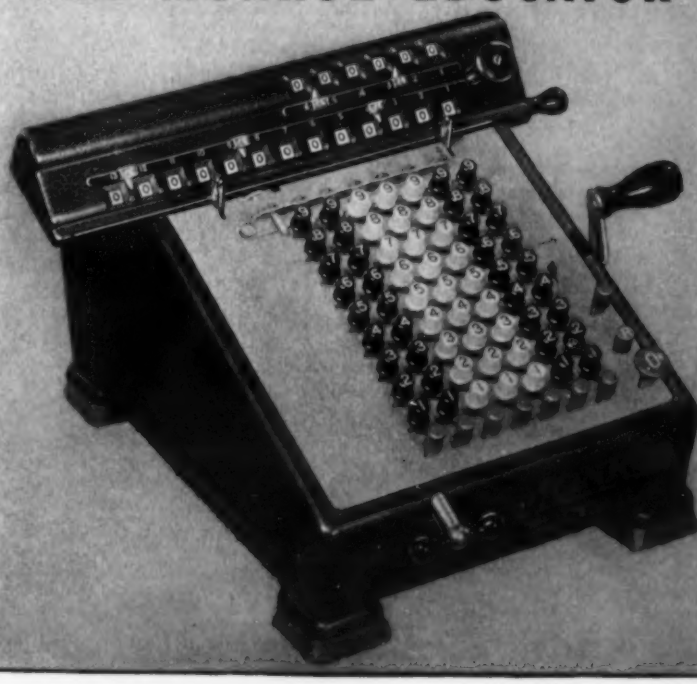

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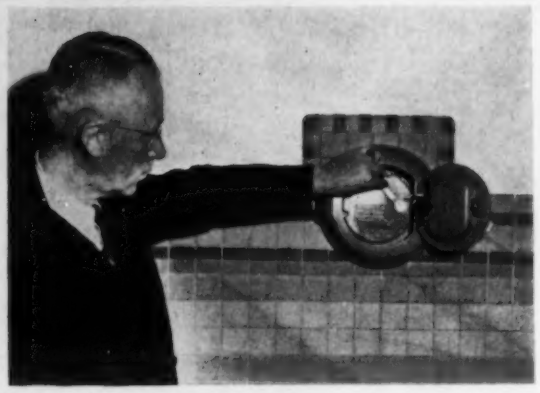

Principal Sounding a Drill Alarm. Open "Drill" Door Disconnects System from Municipal Fire Department.

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Getting school children out of a school building quickly and in an orderly manner is a worthwhile accomplishment for any school principal. In the event of actual fire, this may save many lives.

Fire drills also insure that all the fire alarm equipment is in working order. In the Holtzer-Cabot S. A. System, which is double supervised, this is taken care of by trouble bells which automatically sound whenever a circuit disarrangement occurs, permitting prompt response and repair.

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KING COUNTY, WASHINGTON, ECONOMIZES WITH CENTRALIZED PURCHASING

An estimated $42,000 in tax money was saved during the past two years through a system of centralized purchasing operated for 33 of the 36 rural school districts in King County, Wash.

The centralized purchasing is done through the King County Directors' Association, composed of all school-board directors in the county. Although only half of the county's rural school districts are participating in the plan, the number is increasing year by year, and the association hopes that all of them will take part eventually.

The association is able to make a saving on nearly every piece of school equipment because it buys in large quantities — at the same time supplies are purchased for schools in the city of Seattle — and therefore obtains lower prices.

Although the saving for last year, $25,000, is merely an estimate, the association has figures to show that the saving for the previous year amounted to $17,381.12 on janitor and instruction supplies alone. During the school year 1939–40, the association paid only $45,550.23 for supplies which would have cost $62,931.35, had they not been purchased in bulk. The difference amounts to a saving of $17,381.12.

While it would appear that dealers in school supplies are losing money, many have written to the association, commenting that the system actually gives them a greater margin of profit as centralized purchasing cuts down on much of their expense.

Figures reveal that the group of schools which bought through the association last year spent $1.74 less per pupil for janitor and instruction supplies than did a comparable group which bought independently.

This figure was obtained by comparing expenditures of all of King County's rural districts which had an average daily attendance of 100 or more pupils. The expenditures of a group of 20 of these districts averaged $4.46 per pupil, compared to $2.72 per pupil for the 28 larger districts which bought collectively through the association.

R. D. Langstead is manager of the purchasing department. Financially, the department operates along the lines of a school district, with the funds being handled through the offices of the auditor and treasurer of King County.

KENOSHA FIXES TEACHER STATUS

The board of education of Kenosha, Wis., has had under consideration for some months a definition as to the relations that should be observed between the administrative body and the teaching force of the public school system. At a recent meeting the board established the teacher status in the following resolution:

I. A "teacher" as herein used is defined as being a full-time employee of the Kenosha board of education, who possesses a teacher's certificate which qualifies under the Wisconsin state laws and who also qualifies under the rules of employment of the said board.

II. The board of education of the City of Kenosha, Wis., hereby establishes a policy relative to the employment of each of its teachers, as follows:

1. That no teacher be subject to the provisions of this resolution until he or she shall have been employed by the said board of education two school years and approved for further employment.

2. That all teachers under employment at the time of the passage of this resolution and who shall have been under employment of the said board of education for two full school years previous to the passage of this resolution shall be considered as being subject to the provisions of this resolution.

3. That all rights of employment, whether the teacher is subject to the provisions of this resolution or not, shall cease for each teacher upon his or her sixty-fifth birthday. Following the said sixty-fifth birthday such teacher shall automatically be dropped from employment and from the pay roll of the board before the start of the next semester of the school year, and no financial contract shall be issued to extend beyond the retirement date. Existing contracts shall not be affected by this provision.

4. That all teachers shall furnish to the board in such form and manner as the board may regulate, a certificate of birth or proof of age.

5. No teacher who has not reached the retirement date set in paragraph three (3) hereof, shall be refused employment, dismissed, removed, or discharged except for willful neglect of duty, repeated violation of the published rules of the board, conviction of felony, immorality, or continued physical or mental incapacity to perform his or her duties.

Teachers under accusation shall be notified in writing by the board of the date and place of the hearing and furnished with a copy of the charges at least 30 school days before the time set for such hearing. Such hearings shall be public and the accused may be represented by an attorney and he shall have the right to present evidence and testimony that may be appropriate in his defense. The accused may waive such hearing. The action and the decision of the board in any such case shall be final.

6. Any teacher convicted of felony may be suspended by the board without notice.

7. That the board reserves the right to release teachers who are subject to the provisions of this resolution whenever the enrollment of the schools or their operating revenues require a reduction in the size of the teaching force as determined by the board, after consultation with representatives of the recognized teachers' organizations. Such release shall be in inverse order of the original employment and seniority reinstating privilege for each teacher shall cease after a two-year period.

8. That the board proposes to amend or change parts of this policy only after consultation with representatives of the recognized teachers' organizations.

9. That whenever time permits the board shall publicly announce all vacancies in the school system. Such vacancies shall be filled by qualified persons who are already employed in the Kenosha schools, whenever this can be done with advantage.

● The school board at Corunna, Mich., has reorganized with JAMES QUAYLE as president; RUSSELL OLMSTEAD as secretary; and RAY GELLATLY as treasurer.

● FRED W. MALENFANT, president of the school board at Cheboygan, Mich., died at a hospital in Petoskey, after a short illness. Mr. Malenfant had been a member of the board for 20 years, and had been re-elected for another two-year term. He had acted as president for several years.

● SUPT. HARRY S. BERGER, of Deadwood, S. Dak., has been re-elected for a new three-year term. Superintendent Berger is entering upon his fourteenth year of service in the school system.

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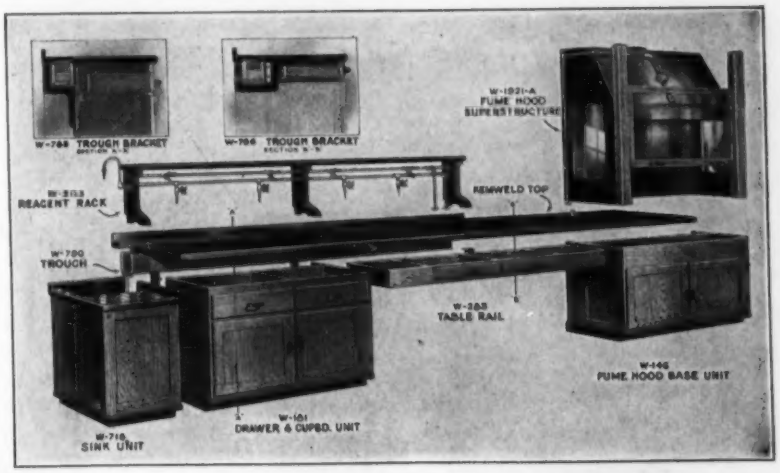

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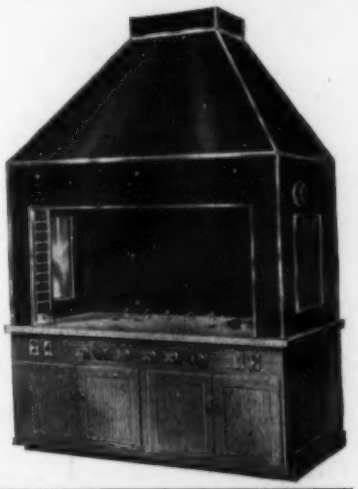

BROCKTON OFFERS DISTRIBUTIVE OCCUPATIONS COURSE

During the school year 1940–41 trade extension classes in distribution were established as a new department in the evening school in Brockton, Mass. These classes resulted in a program of occupational training for those regularly employed in the field of merchandising. Courses in techniques of selling, meat merchandising, and window display have been conducted, with an enrollment of 61 pupils.

The courses which were conducted under the supervision of the State Department of Vocational Education were financed from funds provided by the state and Federal Government. Fifty per cent of the cost was supplied from George-Deen funds, and 50 per cent of the remaining cost was received from the state.

In addition to these courses, a course for those employed as waitresses was also offered. Only a small number of students enrolled, which was attributed to the hours of employment which made it difficult for many persons to attend. It is planned to develop further instruction in this occupation.

PROGRESS IN TONOPAH, NEVADA

A 28-page handbook on guidance, giving guidance material for the next two years, 1941–42 and 1942–43, has been issued by the Tonopah High School, Tonopah, Nev. The handbook, the work of the student body and faculty, includes also school calendars for the two years, courses of study, home rooms, classifications, class periods, vocational class schedules, attendance laws, and requirements for entrance into the state university. Students, teachers, and parents have found the handbook useful for orientation material.

A girls' quartette and mixed chorus has been formed this year. A recording of voices has been made on several selections. This recognition has served to stimulate interest and perfection in glee club and vocal work in general in the music department.

A high school carnival is conducted as a major student activity annually in October. Recognized student-body activities receive a certain percentage of the receipts of the carnival. This year a gross sum of $761 and a net of $620 was realized by the high school. This is considered quite remarkable in a high school with an enrollment of slightly less than 100.

A department of auto mechanics, established in September, 1939, is now graduating five students each year. The course covers two years and the school has maintained a 100 per cent job placement of these boys. Town officials and business houses have commented favorably on the type of work carried out by the boys in these classes.

IMPROVEMENTS EFFECTED IN BRYAN, OHIO

A program of remodeling and redecoration has been carried out in the Lincoln elementary school at Bryan, Ohio, which has eliminated completely gloom and eyestrain. The work was carried out by the local school custodians. Pastel shades were used in the classrooms and cheerful colors were carried out in the corridors.

In the decorating program all rooms were given an off-white ceiling to obtain greater light reflection. In the first-grade room a reddish beige was used around the windows and under the blackboards, with a light grayish green on the three other walls. A fifth- and sixth-grade room has a coral rear wall above white enamel bookcases, and a chartreuse color on the other walls, with a coral dado.

In another classroom, the walls are three broad horizontal bands shading from deep blue at the floor, to lighter blue at the off-white ceiling. Other combinations used are rose walls with bluish-green dado, pastel blue side walls with reddish cork dado, and suntone yellow walls with cork dado. All color schemes were planned scientifically, using warm colors in north rooms and cool colors in those with a southern exposure.

The school officials believe that the new decorating scheme has been effective in eliminating eyestrain and making it possible for students to become more relaxed. It will pay dividends in better order and attention in classes.

UNIFORM SIGNAL SYSTEM FOR AIR RAIDS

In New York City a uniform telephonic signal system has been devised by which the city school authorities can simultaneously warn the public, parochial, and private schools of an impending air raid. Under the system a notice is sent simultaneously from the school-board headquarters when an air raid is imminent.

As an extra precaution, each school is equipped with a radio to receive notice of air-raid warnings over WNYC. The plan also calls for having someone in the home at all times to receive the children should they be sent home from school. In areas of one- and two-family houses, parents living on the same block have arranged a system of coverage. Elementary and junior high school children, living within 10 minutes' distance of the school, will be sent home in event of an air raid.

FARGO BOARD INCREASES TEACHERS' SALARIES

The board of education of Fargo, N. Dak., has voted a 15 per cent readjustment of salaries for teachers, principals, librarians, deans, and supervisors during the school year. A second adjustment will be paid in a like amount on April 30, 1942, and a third in June, 1942.

The board has given the reasons for spacing the three adjustments at intervals of three months. For the past two years taxes had become delinquent on March 1 and there was a special inducement in the form of a 5 per cent discount to all who would pay their taxes before February 15. The legislature changed the date and made April 1 the final date for receiving the discount, and May 1 the delinquency date. The board must now run two months longer on its cash reserve or from February to April, before the heavy tax payments are made.

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IDENTIFICATION TAGS FOR SCHOOL CHILDREN

In Los Angeles, Calif., Supt. Vierling Kersey has ordered that all pupils carry identification tags. Parents of elementary pupils have made tags of cloth with names, addresses, and telephone numbers. School authorities have provided tags for older pupils.

The order is part of a nation-wide program which has been worked out by the U. S. Children's Bureau and the Office of Civilian Defense for the protection of school children in American cities in event of air raids, or if it becomes necessary to evacuate them.

The program developed by the U. S. Children's Bureau is based on the war experiences of France and England. The Bureau is also working out a method of registering children.

FIRE-DEPARTMENT REGULATIONS FOR SCHOOLS

In response to a request of Supt. Joseph P. Nourse, the fire department of San Francisco, Calif., has issued new regulations governing the movement of children in case of an impending air raid. The department has perfected plans for designating the places for the quartering of children who remain in schools during an air raid.

The regulations are as follows:

1. All school buildings are to be cleared of children upon the first notification of an impending air-raid alarm. The information must be communicated to the school principals at least 15 minutes prior to the sounding of the siren signal.

2. All children living in excess of 15 minutes' walking distance of the school must remain in the school building with teachers at an appointed place.

3. Regulations governing the emptying of all school buildings upon the sounding of the first alarm have been prepared. All principals must instruct the children to proceed to their homes by the shortest route.

4. In the elementary schools teachers will be assigned to accompany children along the designated routes within the limits of the district. Children whose parents are not at home during the day must remain with others at the school under the supervision of the teachers.

5. In the secondary schools, day or evening, pupils will be dismissed without teacher escorts but with specific warning to proceed home with dispatch.

6. Pupils in special schools, or classes, in the various schools must remain in the schools until the *all-clear* signal is given.

7. If fire, explosion, or other serious condition occurs in, or adjacent to, a school building the pupils must be dismissed to their homes or other safe refuge, with the least possible delay consistent with their safety.

MONTANA SCHOOL BOARDS TO MEET AT MISSOULA

The Montana School Boards Association will meet in Missoula, on January 19 and 20, 1942.

On the first day there will be a panel discussion, with Miss Elizabeth Ireland as leader. In the afternoon there will be a discussion on tax income, with Fred Bennion as chairman. Dr. G. D. Shallenberger, of the State University, will talk on the subject, "Why Not Montana Teachers?" Governor Sam C. Ford and John Bonner, attorney general, will also speak.

The second day's session will open with a panel discussion on association membership, with Mr. A. E. Dyke as leader. Rev. Thomas W. Bennett will give a talk on "The Responsibility of Boards of Trustees in Developing Good Citizens." Dr. E. O. Melby will also speak. At the afternoon session the members will listen to the reports of the various committees and the election of officers will take place.

MINNESOTA SCHOOL BOARDS WILL MEET IN MINNEAPOLIS

The Minnesota School Board Association will hold their twenty-first annual convention in Minneapolis, February 11, 12, and 13, 1942. The attendance will be around 4000 and will include members of both rural and city school boards. The official headquarters will be in the Curtis Hotel.

The main theme of the program will be "The Interim Report on Education." This report will take up the changes in state aids for school districts. The revenue received from state income taxes will also be discussed.

Information concerning the program and the speakers may be obtained from Mr. Tom O'Brien, president, at Brainerd, or from Mr. John E. Palmer, secretary, at Fergus Falls.

PENNSYLVANIA SCHOOL DIRECTORS TO MEET IN HARRISBURG

The forty-seventh annual convention of the Pennsylvania State School Directors' Association will be held in the Education Building at Harrisburg, February 6–8, 1942. President D. A. Best, of McKeesport will preside.

The first session will open on February 6 with talks by D. A. Best, Dr. Francis B. Haas, and H. W. Prentis, Jr. At the afternoon session there will be addresses by Dr. Worth Shoemaker and A. C. Marts. A sectional meeting for county school boards will be held, with Mr. J. Dean Polen in charge.

At the session on February 7, Miss Lucy Glass and Miss S. M. R. O'Hara will speak.

ASSOCIATED SCHOOL BOARDS OF SOUTH DAKOTA MEET IN SIOUX FALLS

A sectional meeting of the Associated School Boards of South Dakota was held at Sioux Falls, on October 31, in connection with the meeting of the South Dakota Education Association. President Israel Daniels, of Yankton, acted as chairman.

The meeting was opened with a talk by Supt. J. F. Hines, of the State Department of Education, on "Current School Legislation."

Dr. John W. Headley, of Madison, speaking on "The Equalization of Tax Burdens," said that he was opposed to state aid, and cited the case of New York State which received equalization aid and found it burdensome. Dr. Headley urged the appointment of a state commission on taxation.

Mr. Blaine Simons, who substituted for Mr. Claude A. Hamilton, gave an inspiring talk on "The Schools and National Defense." Dr. J. B. Gregg, of Sioux Falls, was in charge of the round-table discussion which took up salary schedules, school-board membership, and current problems.

At the business session new officers for the year 1942 were elected as follows: president, John Matthews, Lennox; vice-president, E. G. Hanson, Parker; secretary, W. C. Leyse, Sioux Falls.

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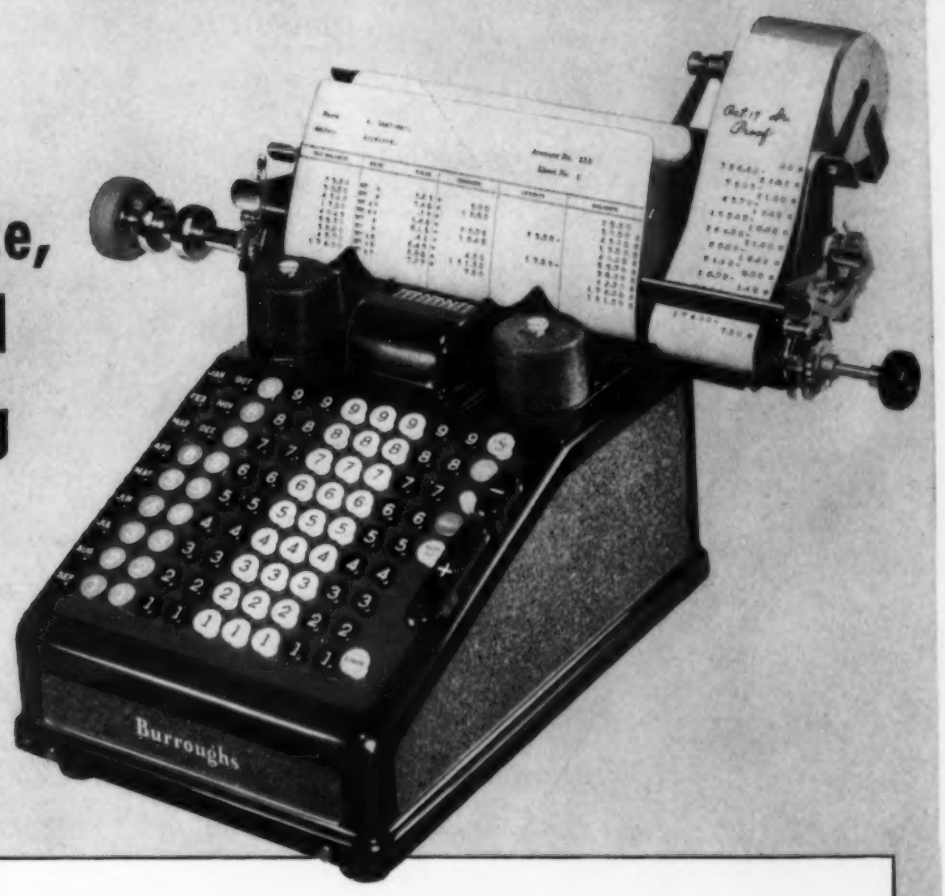

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This Business of School Feeding — VIII

George H. Mueller[1]

"Educators and school-business officials will be much interested and, perhaps, a little shocked to learn of a new system of school administration that is proposed for the city of Notown, a sizable community located in the Middle West. Eager as are all school officials to provide adequate educational facilities, the Notown school board proposes to completely decentralize their administrative system. Each principal will operate his school as an independent entity, both with regard to its educational as well as business policies. Textbooks, program curriculum, purchases, in fact all affairs are to be handled without any vestige of cooperation or co-ordination between the considerable number of schools located in Notown. Results of this experiment in ultramodern educational methods will be followed closely by school administrators throughout the country." — *Notown news item.*

Such an announcement would indeed be considered retrogressive in the vital field of public education — and yet, an analogous condition does still exist in many large school districts. I refer to decentralized management of school cafeterias. Alert educators have long been aware of the importance of school feeding and have promoted this important part of the school program. That children must be properly nourished to be capable of maximum mental and physical effort has always been accepted. The fault lies in the fact that schools have failed in their duty to effectively impress the importance of proper nutrition upon the adolescent mind.

What advantages then may be expected from a centralized system of cafeteria control? No doubt, the very best possible work is being done by the individually operated school cafeterias, but such a method cannot avail itself of the opportunities and advantages afforded by cooperative management. It is hardly to be supposed that individual schools can support the employment of individual management, a person qualified to handle the complex problems of cafeteria management. A person so qualified could not afford to spend her time operating a single small school.

The True Purpose of Cafeterias

Modern school cafeterias have two major objectives: promoting the health of the students and providing, at minimum cost, nutritious foods. In carrying out the first part of the vital program, an alert specialist is needed. A long-term cooperative program of health education, thoroughly integrated with the general school curriculum, is required. Because of the nature of such work, it can best be done when controlled centrally. Here theory can be combined with practice. The importance of proper food can be taught through classroom instruction and poster displays, and such efforts can be correlated with attractive, well-prepared cafeteria offerings. The average school cafeteria has only started to play its part in building a strong American youth. Now is the time to lay the groundwork for services which in the future will be expected in a greater degree from the schools. To solve this bigger problem and provide an answer to a real and factual need can best be done when all schools in one system work under one directing head. It is a little hard, however, to put into statistical form the multiple and lasting benefits of proper dietary education for health. True, immediate results are evident when the starved child is fed, but results are not so evident when a child suffering from malnutrition is placed upon a proper nutrition program. But we do know from exhaustive experiments that improvements do occur.

So, for the school-board member who is interested in more concrete results, we mention a few other advantages.

Equal opportunity for every school child is the axiom of every board of education. How can centralized cafeteria management equalize school feeding in participating lunchrooms? By the adoption of a uniform policy, identical prices, equal portions, and standard tested recipes are assured in every school cafeteria. Every businessman will admit that quantity purchasing still commands better market prices. In addition, a cafeteria director, free from the petty though important detail of the individual cafeterias, can better determine the best time to make purchases. Here the time consumed by a dozen or more managers in seeing salesmen is saved and can be devoted to the multiple duties of the individual units.

By centralization, a broad general policy as

(Concluded on page 66)

[1]Assistant Secretary, Kansas City Board of Education.

NOBLE B. SCHOONMAKER NEW SUPERINTENDENT AT MINNEAPOLIS

Mr. Noble B. Schoonmaker, formerly principal of the West High School, Minneapolis, Minn., has been elected superintendent of schools, to succeed Carroll R. Reed who has taken a position in Washington.

A native of Smithport, Pa., Mr. Schoonmaker began his teaching career in 1911, following the completion of a two-year course at the Pennsylvania Normal School. He obtained a bachelor of science degree from the State University of Minnesota in 1923, and completed advanced studies at the same institution and at Teachers College, Columbia University.

Mr. Schoonmaker entered the Minneapolis school system after the completion of his army service. He taught in the Bremer Junior High School for two years, and was a principal in several elementary schools prior to his appointment as principal of the West High School, where he has been located for the past seven years.

The new superintendent will face the difficult problem of seeking a solution to the present serious financial situation in which the total estimated revenues for the school year 1942 are $1,000,000 short of the proposed expenditures, provided salaries of school employees are to be paid according to schedule. For the past 10 years the salaries of teachers and employees have been cut in varying amounts and nonpersonnel retrenchments have been effected.

A special School Bus operated on schedule carries children to and from the Orthopedic School in Green Bay, Wisconsin. Matron and driver are shown helping the crippled children.

Salute to GREEN BAY BOARDS OF EDUCATION

Fostered by its Boards and under the able direction of G. E. Denman Superintendent of Schools, Green Bay, Wisconsin, has gone far in the development of "Special Departments". These include Nutrition Centers, the Orthopedic School, Corrective Speech and so forth.

The Orthopedic School now serves the greater part of Northeastern Wisconsin. As part of this activity they operate a special bus.

To you of Green Bay—and to all others of you who are organized to help "special cases"—and normal children, too—prepare for living, we commend the idea that safe transportation of those precious lives is well worth settling, too.

One thing you can do—insist when you buy new buses, that they come equipped with TRU-STOP *Emergency* BRAKES. This is a brake made of rugged, drop-forged discs that operates on the propeller shaft. The discs are ventilated to dissipate braking heat. They enable your driver to make smooth, safe stops from any speed. They help him save his foot brake. They reduce your brake maintenance costs. They save equipment. They often prevent serious accidents.

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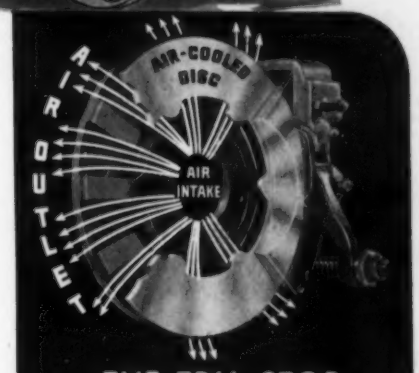

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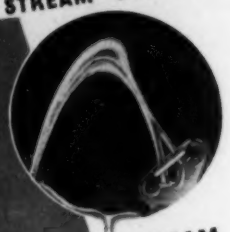

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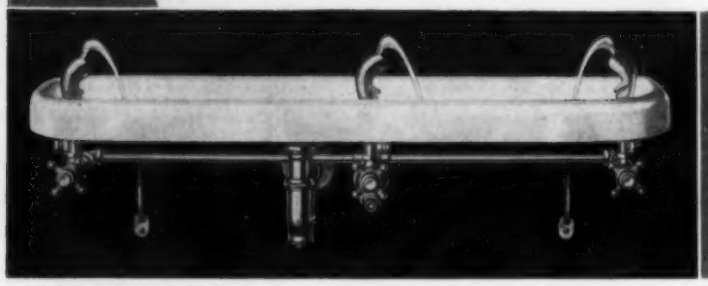

Halsey Taylor
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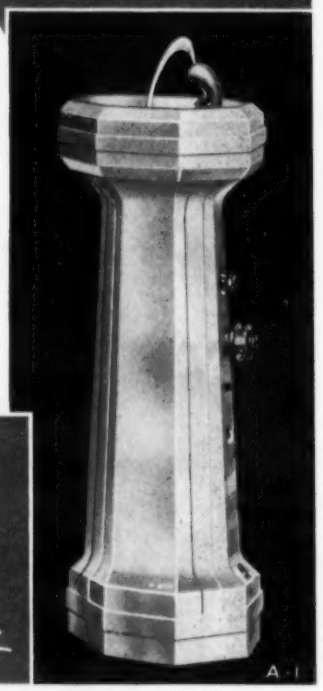

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adopted by the board can be administered in the spirit intended. The school cafeterias are and will be even more important in creating good will among the patrons.

Concerning Prices — What Now?

Certainly a pertinent question propounded by school cafeteria purchasing agents and cafeteria directors. Unfortunately any answer must be pure supposition. The present price-control bill promises no specific or definite relief in the field in which school cafeterias are most interested. We have had repeated statements of generalities — that ceilings would be placed on such items as show unjustifiable increases. We do not, therefore, know as yet just what standard will be used to gauge increases as to their fairness. We may assume that the continued increase in defense spending, with its resultant increase in employment and purchasing power, will justify a continued price spiral.

Manufacturers at present are revamping production policies to conform to their present idea of a long-time program. In many lines the long talked of and lightly felt pinch of priorities has now become an actuality. In anticipation of competition for labor when defense industries reach their peaks in production during the next 18 months, food manufacturers are curtailing their lines of products. It is well to remember that school and college cafeterias must still consider themselves as business establishments and arrange their program accordingly.

What then are some of the problems or conditions which will confront us during the coming year and what steps will we be forced to take? It seems to me that our first big problem is to formulate an educational program to eliminate waste. In this problem, of course, the school cafeterias should simply be a part in an all-inclusive school program. For so many years, the school child has lived in a school and business world of service and easy supplies. In our present all-out efforts, schools will find a decided shortage in the most commonly accepted items. Items of this nature, found in the cafeterias, include paper items, glass, dishes, and silverware. Two or three straws for one bottle of milk, several paper napkins, and the abuse of silverware are but some of the thoughtless wastes which may be witnessed at any school cafeteria. That the attention of the students be drawn to such and similar matters by the cafeteria managers, with the principal's aid, seems to me very appropriate at this time. In addition to the necessity of making every effort to conserve our present supplies, we shall also be faced with a situation beyond our control. Purchasing agents have found that certain fruits have been packed with mixed grades — choice peaches include fruit that might grade only fancy, and fancy include standard — in order to stretch packs as far as possible. School cafeterias will find this practice extended. Furthermore, as costs increase, substitutes and limitations will be the order of the day. We shall come to realize that color and taste do not control the nutritive qualities of the food, and my guess is that menus in school cafeterias will suffer — for the better, perhaps — severe curtailment in variety.

How will increased acreage and production affect food prices? With items grown locally, the fresh items should tend to depress the market, but even this seeming advantage is somewhat minimized due to improved transportation to other markets. With regard to canned goods, the content's cost is a very small percentage of the ultimate selling cost. It must be questioned, therefore, if at the present time there is any prospect that increased production of food, except under circumstances noted, will depress the market. School cafeterias must seek a solution to these price problems by greater efficiency and more economic management.

ALTUS COMPLETES SCHOOL-BUILDING PROJECTS

The board of education at Altus, Okla., during the past four years, has completed the construction of two elementary schools, one junior high school building, and one separate school building. These buildings, all of the one-story type, have been equipped with public-address and intercommunication systems for more efficient administration. All of the new buildings have been erected with the aid of WPA grants, and with the approval of five-mill levies on the school district. There is no indebtedness on any of these buildings. Suitable landscapings have been provided for the new buildings by the Flower clubs which has made them far more attractive.

A new stadium, costing $80,000 has recently been completed, which provides adequate room for athletic events and for outdoor programs for the surrounding country. It is proposed that one additional elementary school shall be erected during the next year.

EQUALIZING OPPORTUNITY

The community high school at Delavan, Ill., under the direction of Supt. Elden D. Finley, has taken a distinct forward step this year toward equalizing educational opportunity by making every activity free to all the students. These activities include athletic contests, school parties, plays, dances, assemblies, the school paper, and the school yearbook.

The action was taken previous to the opening of the school in September. The board felt that since these activities have a very definite value in the school program, they should be included in the cost of education.

They're Weathertight... FOR ALL TIME

Above: Fenestra Projected Fenmark Steel Window that's weather-tight. *Left:* An Ordinary Double-Hung Window that leaks air.

• When you select modern Fenestra School Windows for your buildings you assure your teachers and students of windows that will *always* be weather-tight.

Reasons: (1) each ventilator makes double contact against frame; (2) locking hardware draws ventilator tight shut; (3) window is built of solid-steel sections which never warp or shrink; (4) precision-fitted at the factory, Fenestra Windows stay tight-fitted.

Fenestra School Windows provide: *easy opening*—steel ventilators never warp, swell or stick, and they swing instead of slide; *more daylight*—less frame, more glass; *better ventilation*—open-in ventilator at bottom protects against direct drafts, open-out ventilator forms a canopy over opening; *safe washing*—both sides of glass washed safely from inside a room; *increased fire-safety*—steel does not burn.

The *low cost* of Fenestra School Windows is a surprise to many people. It is due to volume production by America's oldest and largest manufacturer of solid-section steel windows . . . For complete details, write Detroit Steel Products Co., Department AJ-1, 2254 East Grand Boulevard, Detroit, Michigan.

University of Michigan, Health Center, Ann Arbor, Michigan
L. J. Sarvis, Architect;
O. W. Burke Co., Contractors.

Fenestra STEEL WINDOW SYSTEMS FOR SCHOOLS

SCHOOL BUILDINGS FOR WAR EMERGENCY

(Continued from page 56)

sition. Gutters and leaders may be omitted and concrete splash pans and drains provided below.

Wall Construction

Wall-bearing construction may be of brick, cinder, or concrete block, tile block or concrete cored brick walls. Wood studs, steel studs, angles or channels may be used between columns or boxed plywood with built-in insulation.

Exterior applied finishes may be cement-fiber boards, steel sheets, or other panel boards. Cinder or concrete block may be stuccoed on the exterior face and plastered inside or painted with a waterproofing hydraulic base paint on both exterior and interior faces, omitting furring, lathing, and plastering.

Corridor and curtain walls may be finished with any one of a variety of wall or finished surface plaster boards, or plastered or painted.

Wood window sash and frames can be readily used. When available, the commercial projected type steel windows will develop a price for material erected and glazed of about 75 cents a sq. ft. as against $1.40 a sq. ft. for steel architectural projected windows which are fabricated with glazing angles and bronze hardware.

Floor Construction

For the first floor a cement finished concrete slab laid on ballast, preferably cinders, with a sill as shown in the detail, will provide support for curtain walls and additional bracing for the columns. For the second-floor construction either wood joists, precast concrete joists, steel joists, or reinforced concrete may be used.

Thermal Insulation

The roof and walls can be quickly insulated and all joints tightly sealed with a sprayed-on insulation of cellulose, asbestos fiber, and fire-resisting emulsified asphalt binder. A coating 1 in. in thickness has a thermal conductivity of .246 BTU per hour, per square foot, per degree temperature differential. This is 33 per cent more resistant to heat loss than a 13 in. brick wall. The conductivity of the latter is .36. An application of 1 in. costs from 8 to 16 cents per square foot depending on height of roof and scaffolding.

There are many excellent blanket type insulations with coefficients ranging above and below .27.

Finishes and Equipment

A practical inexpensive finish floor for classrooms, corridors, and similar locations is a nitrocellulose composition wearing surface and composition felt base. This material costs from 13 to 15 cents a square foot. Mastic tile, linoleum, or wood are preferable, but more expensive.

Roof constructions and insulation on exterior walls and ceiling may be left exposed, primed, and, together with other wall surfaces, quickly spray painted with casein paint. If desired, the interior surfaces may be covered with wallboard and either plastered or spray painted.

Most equipment such as bookcases, shelving, cupboards, etc., can be readily constructed with plywood or of 13/16 or 1¼-in. wood stock. Flush corridor doors with glazed panels can be made of ⅝-in. plywood on a hollow frame and hung on painted steel butts.

Mechanical Services

a) Heating and Ventilating. For buildings in mild climates window ventilation may be used and a warm-air system provided for heating. In severe climates additional heating facilities should be provided by means of a supplementary steam system. For the former, the furnace room can be on the first-floor level. For the latter, it will be necessary to drop the boiler-room floor level sufficiently to return the condensate. The warm air can be taken to the rooms through the corridor ceiling by means of trunk ducts constructed of gypsum or similar plasterboard or fiber duct with branch connections to room supply outlets. Where a supplementing steam system is used, the rooms can be supplied with an overhead, down-feed supply system, with concealed corridor mains and branches to room blast heaters or mains extending along the exterior walls above the ceiling level with dropped connections to radiators below. The returns, except on large buildings, can be by gravity, with piping in a small recessed floor trench and cover. Coupled with a deep firing system, heavy peak loads and excessive condensate can be avoided.

b) Plumbing. Wrought-iron pipe or tube-loy is taking the place of copper pipe. Steel pipe has an exceedingly short life in sections where the water is chlorinated and should be oversize to compensate for the reduction in area caused by interior corrosion. The use of an automatic syphon tank for batteries of urinals will eliminate many individual valves and fittings.

c) Electric Service. Electrical wiring, bus bars, and switches require copper, one of the most vital of the materials on the critical list. A careful study of panelboard locations will eliminate long runs of conduit and wire. Plugset boards, using RW instead of lead sheathed cable, and chain fixture supports are other economies desirable. One switch to a classroom instead of two will save wiring and the extra switch. Switch plates must be of composition instead of metal. Elaborate light and power distribution panelboards should be discarded for the simple cabinet type. An example may be cited of one New Jersey school district that at the low point of the depression paid $8,500 for an elaborate light and power distribution board for its new high school, while a neighboring community at the peak of predepression prices paid only $350 for the distribution board for a high school three times as large.

Low-tension systems may be reduced in cost by using transformers in place of storage batteries and open circuit telltale fire-alarm systems. A small two- or three-program unit operating corridor and exterior bells is reasonable in cost and worth the expenditure. Manually operated

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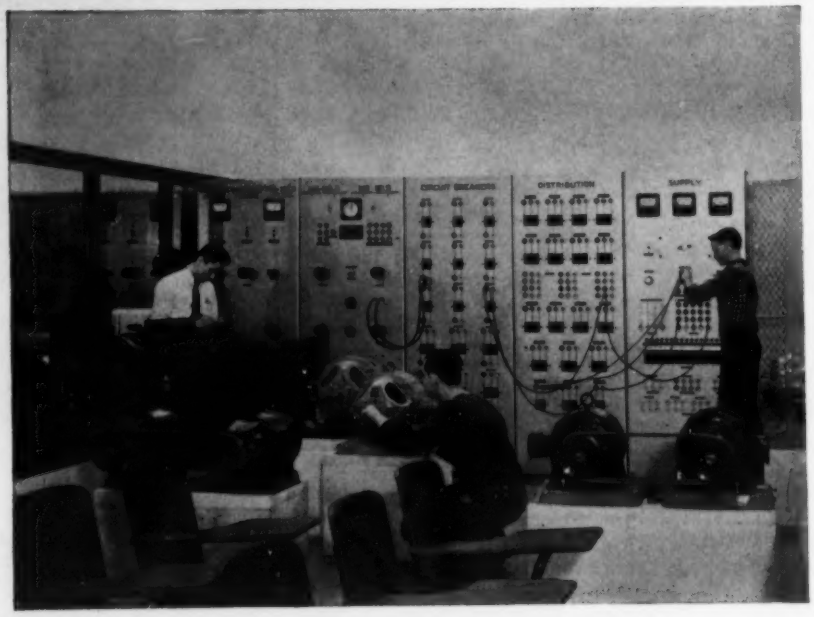

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Standard Engineers will study your present electrical systems and make recommendations for revising, repairing and bringing it up to an efficient level of performance. Fire alarm Systems especially need this periodic service to insure full protection at all times.

The McKeesport Voc. School, Pa., C. R. Moffitt, Architect and the Junior High School, Bloomfield, N.Y., Starrett and Van Vleek, Architects, New York City, described in this issue are completely equipped with Standard Electric Time Co.'s Clocks, Bells, Telephones & Laboratory Panels. Complete information will be sent promptly. Write:

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THE STANDARD ELECTRIC TIME COMPANY

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bells are unsatisfactory to the teaching staff.

Conversion Into Permanent Buildings

When apparent that the school building will be continued in use indefinitely and when prices and economic conditions warrant, the Nuclear type building may be converted into a permanent-type building by a brick veneer on the exterior; or a brick veneer and concrete core; or stucco finish on concrete block. More elaborate interior finishes may be added. The flexibility of the building permits easy shifting of curtain walls to meet changing educational needs.

The Nuclear type of school building is not only desirable but essential during the present national emergency. *The needs of education must be served,* but the solution must give the greatest service at the least cost. New school construction must take into account the type of material available under priorities, yet efficiently and expeditiously meet schoolhousing demands caused by overnight industrial expansion in new areas.

Finally, the Nuclear type is the answer to the appalling burden the taxpayer will have to bear during emergency and its aftermath.

Publications of Interest to School-Business Executives

Finance and Business Administration

Prepared under the direction of Edgar L. Morphet, chairman of the committee on finance and business administration. Bulletin No. 2, April, 1941. Published by the American Educational Research Association, Washington, D. C.

This report reviews the literature on school finance and the business administration of school systems from April, 1938, down to the present. Each of the 13 chapters has been prepared by an experienced specialist who is working directly in the field represented. The chapters take up respectively the planning of school financing and business administration; the support of education from the standpoint of current problems and major sources of income; the budgeting procedure; accounting and reporting and insurance problems; the analysis of educational costs; the problems of school-board credit; the effects of school district organization on business administration; the organization and management of transportation; the purchase and distribution of supplies and textbooks; the management of school-business personnel; the law on school finance and business administration; finally, present tendencies, merging patterns, and future conditions. Each chapter is followed by an extensive bibliography. The entire report is authoritative and most helpful.

It would be interesting if a study of the present kind were supplemented by more of the general literature on municipal and state administration. School authorities could learn much from the general organizations in the field of public administration, particularly in the special fields of taxation, accounting, purchasing, and personnel management.

School Building Code

Paper, 128 pages. Prepared by John E. Nichols, State Supervisor of Buildings and Plans. Published by the State Board of Education, Hartford, Conn.

This code, prepared under the direction of the state department of education, is intended to provide a basis for a common understanding by architects, school authorities, and the state department. It is intended to be helpful to local authorities in solving their building problems economically and soundly.

The preparation of the code was begun with the idea in mind of developing better practices in the planning and designing of school buildings. The new code is applicable only to new buildings and additions and does not take into account buildings already constructed or buildings for which plans and specifications have been previously approved by the State Department. The code takes up such essential points as the preparation of the building program and the selection of an architect, the selection of the site, a study of the building and its physical relationships, the special features of the classrooms and administrative units, the structural and mechanical features, and the structural details, including the equipment and the interior features. Following are outlines of the chapters:

I. State Participation in School Building Projects. Because of current needs and educational trends steps must be taken to insure not only safety, health, and economy but also the flexibility essential in rapidly developing education. The School Building Code adopted by the State Board of Education of Hartford, Conn., attempts to do this as well as to make action by the State Board of Education largely impersonal. The Code is intended primarily to provide a basis for a common understanding by architects, local authorities, and the State Department of Education. It is desired that the state's activities in this respect be considered a service rather than a regulatory function.

II. Conduct of a Building Program. Educational needs should determine the school design. Action should not be taken on appropriations before cost requirements have been fully ascertained. Because school design and construction constitute a highly specialized branch of architecture, the architect must be thoroughly conversant with trends and recent developments in the philosophy of education in addition to having the other qualities of a good architect plus ethical soundness.

In the evolution of building plans, preliminary plans are the most vital. The architect must solve all of the important problems that confront him and determine the layout of the new building and its future extensions.

No plans should be accepted as final unless they will with certainty meet the needs of the situation.

III. The Site. The site is as much a part of the school as the building itself. Today the school is considered as having not only an educational but also a community recreational function as well.

In purchasing school property, ample provision should be made for future expansion. The shape of the school property should not be pinched in any direction and its dimensions should be proportional to the size and type of the school.

Because of the peculiar function of the school, quiet, clean, and bright surroundings are required. When it comes to an issue, it is best to sacrifice exact centrality for other site requisites especially those of size and environment. Safety and convenience of approach are of prime importance.

The fullest possible utilization of school grounds is dictated by simple principles of economy and efficiency. In laying out playgrounds emphasis should be on the affording of recreational facilities for all of the pupils.

IV. The Building. The school building must be as varied in its resources as the life of the community. There are two especially important principles that make for satisfactory school layouts: first, the greatest praticable reduction in the number of stories, and second, the adoption of the open-type plan as opposed to the block type.

Not only should the initial plan anticipate additions doubling, or even trebling the building in size, but it

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should permit as much latitude as possible in the nature of these additions. Interior flexibility, like expansibility, is a requisite of far-sighted planning. The need for internal readjustments is a natural consequence of developments in the educational program over a period of years.

Since the building of a school is essentially a community enterprise and since it represents a heavy investment on the part of the community it is but sound business so to shape that investment as to realize on it the fullest possible returns in terms of service to the community.

V. The Schoolrooms. The effective functioning of the school program requires a close co-ordination of all varied school activities. For purposes of convenience and administration these school activities are grouped into subject-matter areas, but this grouping must of necessity be largely artificial. The book offers a brief review of the principal special school units, outlining their desirable locations, sizes, and other characteristics.

VI. Structural and Mechanical Details. The architect, engineer, and contractor as part of their services upon a building project, are responsible for producing a building that is structurally and mechanically sound. The code sets up requirements for fire resistance and quality in construction.

The type of illumination that is adopted must provide an even distribution of light of adequate intensities — free of glare, dense or dark shadows, and extreme contrasts.

Continued research in the field of heating and ventilation indicates the desirability of a return to the simpler methods, especially the well-established direct radiation, window supply system, with duct exhaust either by gravity or fans. The results attained with such a system, well installed, are equal to those generally obtained with the more elaborate mechanical systems. They have the added advantage of being the least expensive to install, maintain, and operate.

The specific needs of the pupils should be the primary consideration in the selection of plumbing equipment.

Chapter VII outlines the details required of plans and construction of stairways, exits and entrances, corridors, toilet rooms, windows, doors, floors, acoustics, lockers, finish, blackboards and tackboards, and fire protection.

An appendix contains an architects' check list, a score card, a survey and specification outline, and a standard form of agreement between owner and architect.

The code is characterized by two important features: (1) It approaches the problem to encourage truly functional planning and to help local school authorities to think through their problems; (2) so far as possible, the minimum requirements are flexible so that improvements due to scientific findings and the production of new materials may be used.

Expenditures per Pupil in City Schools, 1939–1940

By Lester B. Herlihy and Mary Ella W. Banfield. Paper, 31 pages. Circular No. 200, 1941. Issued by the U. S. Office of Education, Federal Security Agency, Washington, D. C.

The present report furnishes a source of reference on per pupil expenditures in city school systems, which will indicate the central tendencies with respect to current expense items, and also the trends in these expenditures over the years. The study serves as an annual presentation of data for city school systems, since the Biennial Survey of Education provides city school data for one year of each biennium only.

Expenditures per Pupil for Fixed Charges and Auxiliary Services, 1937–1938

By Lester B. Herlihy. Paper, 9 pages. Circular No. 192, 1941. Issued by the U. S. Office of Education, Federal Security Agency, Washington, D. C.

This report offers a summary, by geographic regions, of the detailed expenditures per pupil for fixed charges in 83 cities and for co-ordinate activities and auxiliary agencies in 89 large city school systems for the year ending June, 1938. The computations are based on the expenditures for these accounts and on the number of pupils in average daily attendance.

The report shows that the expenditure per pupil in average daily attendance in 44 school systems of cities of 100,000 to 999,999 population for pension or retirement funds averaged $3.02, while in the five largest cities it was more than double this amount, or $7.

Expenditures per Pupil for Operation of Public-School Plant, 1937–1938

By Lester B. Herlihy. Paper, 9 pages. Circular No. 199, 1941. Issued by the U. S. Office of Education, Federal Security Agency, Washington, D. C.

A report on accounting classifications in large city public school systems, grouped under three general headings: (1) current expense, (2) capital outlay, and (3) debt service. The findings indicate the central tendencies in the practice of expenditure for the various divisions, and the means of ascertaining the comparable status of the expenditures for school-plant operation in any single system, or group of systems.

School Transportation

Compiled by A. R. Meadows and Edgar L. Morphet. Paper, 47 pages. Bulletin No. 2, 1941, on Improving Education in the Southern States. Issued by the Southern States Work-Conference on School Administrative Problems, Edgar L. Morphet, secretary, Tallahassee, Fla.

This report, a continuation of the studies begun in 1940, deals specifically with (1) bus specifications, (2) school-bus priorities, (3) ownership and purchase of bus equipment, (4) safety rules and regulations, (5) bus shop plans and specifications, (6) insurance, and (7) accounting.

The study revealed that there is a rapid trend toward public ownership and operation, with marked economy and increased safety. There is greater uniformity in accounting procedures, and there is a trend toward uniform regulations for greater safety in transportation. A wide variation in cost of equipment and in cost of insurance still exists to a greater extent than is justified. It is suggested that studies be made of techniques and procedures for routing buses in terms of adequate centers, pupil home locations, and road conditions.

Weights and Measures Administration

By Ralph W. Smith. Cloth, 292 pages. Price, 75 cents. Published by the Government Printing Office, Washington, D. C.

This handbook, a revision of the Bureau of Standards Handbook H–11, is designed to supply information on the general aspects of weights and measures supervision. It includes model forms of weights and measures organization, specifications and regulations, weights and measures standards, weighing and measuring devices, schedule of weights and measures standards and equipment, and federal laws in relation to weights and measures, and regulations promulgated. The work includes useful chapters on the education of users of weighing and measuring devices and of the public generally.

Air Raid Warning System

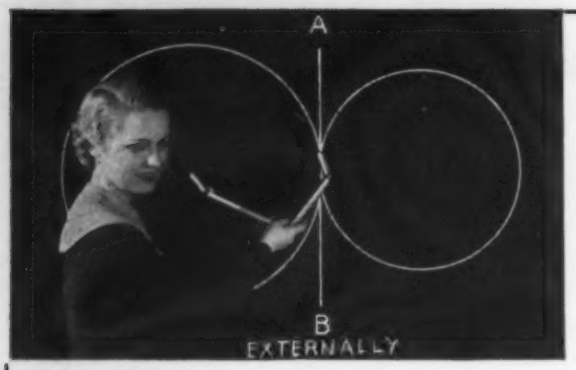
Paper, 18 pages. Bulletin No. 11, September, 1941. Prepared under the supervision of the chief signal officer of the U. S. Army. Issued by the United States Office of Civilian Defense, Washington, D. C.

The pamphlet contains data and information based upon the latest and most authoritative information available. It includes many helpful suggestions which may be modified and adapted to each local situation. The pamphlet is to be used as a guide to local civilian defense organizations in the proper and efficient discharge of their duties with the air-raid warning service.

Suggestions for State and Local Fire Defense

Paper, 27 pages. Price, 10 cents. Fire Series Bulletin No. 1, 1941. Prepared by the Advisory Committee on Fire Defense of the Civilian Defense. Issued by the Government Printing Office, Washington, D. C.

This pamphlet comprises a program of fire prevention and fire protection as part of the civilian-defense program.



How Many Are You Using?

1. The blackboard may be used as a means of illustrating important and difficult points.
2. The blackboard may be used as a means of giving directions for pupil activities.
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THE ARCHITECT LOOKS AT SCHOOLROOMS

(Concluded from page 47)

intensity is raised above 3.1 foot-candles. Since a margin of safety is desirable it is suggested that 10 to 15 foot-candles be employed when reading this size type or slightly larger type (10 to 12 point)."

A report of the American Council on Optics and Visual Physiology issued in 1939 (Dr. Alfred Cowan, chairman of the Committee on Code of Lighting) warns against making changes in existing schools until after further research.

These notes should be supplemented by a statement from one of our medical authorities, reading as follows:

Dear Mr. Greeley:

To the best of my knowledge there is not the slightest scientific evidence that insufficient light either caused or aggravated any pathological eye condition. Studies based on measurements of visual acuity and work efficiency have seemed to indicate that a maximum of ten candle power is sufficient for all purposes, but the increment in visual acuity and work efficiency between five and ten candle power is very slight. Most of us are perfectly happy reading with five candle power, or somewhere between five and ten.

Another ophthalmologist has stated that reading in dim light does no more injury to the eyes, than listening to faint sounds does to the ears. He explains that in either case there might be exhaustion of the center of attention, and that this exhaustion might create discomfort, but not injury to the eyes.

It is a matter of importance that the school public should understand that the eyesight of their children is not going to be injured, whether classroom lighting provides 5 or 35 foot-candles. The eye of the child is very sensitive, and the page of a book is very white, and the child seems to prefer to read in a dim light, even when brighter lights are available. This is a matter of common observation in any family.

If limited lighting does not injure eyesight, the only dangers must come from light that is too intense. Glasses to cut down excessive light are widely used in many walks of life. Classrooms with the normal window area of 20 per cent of the floor are darkened on bright days by the voluntary drawing of the shades. Few people find it comfortable to read a page upon which the sun is shining.

Quae cum ita sint, let not the parents be stampeded into panic for fear that blindness will result from dim lighting. Let them associate the eye with the ear, and recall that as the latter is injured not by soft but by loud noises, so the former suffers from too much, not too little, light.

Daylight is subject to changing intensities. Artificial light can be made unchanging. Shall we insist on automatic regulating devices to stabilize illumination, and eventually give up windows entirely, or is the eye built to adapt itself easily to variations in intensity?

In answer to this question medical science says: "Variation of light in a schoolroom would not have the slightest bad effect on any part of the visual apparatus."

Of a somewhat similar nature is the problem of excessive heat. Is the body affected adversely or favorably by an evenly maintained temperature? Is the mind, as a consequence, soothed into inactivity if not torpor, or stimulated so as to be responsive to teacher demands? There is excellent authority back of the old classroom methods of "ventilation by perflation." To open the windows between classes, flush out the warm air with fresh outdoor air, while the children stand and do some kind of stretching gymnastics, has a stimulating tendency. It finds its counterpart in father's morning cold dip or shower, undeniably stimulating. What should be done about the schoolroom ventilation?

In attempting to summarize these observations upon classroom design, it must be recognized that the tendency to standardization gradually becomes a tendency to stagnation. To stereotype the rectangular classroom, crowds out experimentation with interesting alternate forms. To stereotype all lighting on a commercially gratifying high candle power, is unscientific and wasteful.

The millennium has not been reached in school-building planning, and a present essential element of needed progress is flexibility of standards. The schoolroom must be constantly adjusted to new conceptions of school organization, to new methods of teaching, to newer objectives of education. The elements of shape and size, of lighting and heating, of built-in equipment must take into account the new findings in the fields of safety, health, and physical welfare, as well as progress in child psychology and in new building materials.

These new conceptions form themselves in the minds of architects and school superintendents whose public is rigidly conservative, and who need conviction and courage for their pioneering.

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A MONTH LATER
EMILY, THAT Automatic SHARPENER IS GREAT! HELP'S DISCIPLINE, MEANS CLEANER HANDS..
... AND NO MORE CUT FINGERS OR MESSY SHAVINGS ON THE FLOOR!

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Producers of "Sani" Food and Drink Equipment

COOPERATIVE PLANNING

(Concluded from page 31)

one of the glorifying features of the building.

Separate community entrances, lobbies, toilet facilities, heating and lighting mains were provided for the auditorium, library, gymnasium, and cafeteria, to insure ideal and efficient educational administration and use, and at the same time provide complete isolation for the extensive adult and community use of these facilities.

The main entrance lobby, with walls of polished St. Genevieve Rose marble, aluminum and chromium doors and trim, and special indirect-lighting effects, opens directly into the auditorium which seats 800. The walls and ceilings of the auditorium are streamlined in pleasing curves to effect a maximum of visibility and acoustical efficiency. The walls are completely covered with flush set "fiddle-back" mahogany, the floors are of mastic tile with aisles of rubber tile. A flood of uniform lighting, without glare, reflection, or awareness of the source of the light is provided in the auditorium from concealed sources.

The library on the first floor in the southwestern wing has a seating capacity of 126, a book capacity of 12,000 volumes, and a floor area of 2400 sq. ft. The walls are covered with lacewood, and the furniture and stacks are finished to match. The floors are inlays of linoleum, and the wide aluminum frame windows are provided with ornamental Venetian blinds and harmonizing overhangings.

A Complete Gymnasium

The gymnasium unit has a floor area of 6300 sq. ft. and is divided into separate units for boys and girls by electrically operated soundproof partitions. When used for public exhibitions, the partition folds into recesses. Folding bleachers provide seating capacity for 800. The floors are of maple and the walls are large brick units laid in a pleasing pattern. The ceiling is acoustical tile, and the lighting by diffusing lens fixtures. A separate entrance lobby leading to the main driveway and parking spaces provides access for public exhibitions and evening uses. A foyer off the "ground" floor corridor of the school proper forms the access from the school. This foyer together with acoustical treatment eliminates gymnasium noises from the school proper.

The cafeteria, the faculty dining room, and the kitchen and serving counters are located over the gymnasium. This location saved material construction costs, and eliminated food odors and kitchen noises from the building.

The cafeteria seating 488 has many features of the advanced planning which are so evident throughout the entire building. This unit is most colorful and attractive. The wainscots are of terra cotta in warm shades of green, with blending painted plaster walls above. The floor is mastic tile and the ceiling ivory acoustical tile. The aluminum frame windows have contrasting colored venetian blinds and large floral pattern casement cloth overhangings. A soundproof electrically operated folding partition divides the cafeteria, providing flexible administration for food service or study-hall purposes. The kitchen and serving counters can be completely isolated by soundproof doors and partitions.

While the academic classrooms and special rooms have many common features, particular attention and emphasis was given to the color treatment to secure a cheerful, restful, homelike atmosphere. Many color studies were made, adopting pastel shades of yellow, green, and blue, basing selections in the various rooms on the orientation, reflecting, and absorbing light conditions.

The academic classrooms, 48 in number, are generally 22½ by 30 ft. in area and have the following specifications:

Floors — Maple or mastic tile.

Trim — Enameled metal, base, picture mold, door-frames, and window sills.

Doors — Smooth flush panel type with small clear glass observation panel.

Windows — Double-hung aluminum frames (never require exterior or interior painting) equipped with integral weather stripping and adjustable enclosed sash balances.

Blackboards and Corkboards — Black slate boards were generally used. These and corkboards were set flush with the walls in drawn and cast aluminum frames. Oyster white glass board sections were used in isolated cases.

Electric Fixtures — Special diffusing lenses set flush with the ceiling with bulbs in dustproof concealed cabinets. Uniform lighting of 18–20 foot-candles without glare, shadows or hanging fixtures.

Heating — Individual units supplying fresh filtered air in each room, controlled by individual thermostats.

Accessories — Secondary clock, telephone, heat control, radio. *Loud-Speaker.*

The mechanical equipment incorporates the most advanced engineering. Every item of equipment and detail of installation has been planned for long life, economical operation, and to reduce maintenance costs to a minimum. The hazards and losses due to breakdown of the equipment have been met by providing duplicate installations of units.

The equipment includes such items as underground service lines, low pressure steel boilers with charcoal iron tubes, full automatic-control high-low-flame oil burners adapted to heavy bunker oil, welded wrought-iron steam lines, brass water piping, porcelain and marble fixtures, electric program system with master and secondary clocks, and telephones and fire-protection equipment.

A complete two-channel centralized radio and broadcasting system is arranged for radio programs, announcements, etc.

The building, equipment, grounds, landscaping and all fees, represents a cost of approximately $1,250,000. The federal Public Works Agency assisted materially in financing this cost by a 45 per cent grant.

SCHOOLHOUSES FOR HEALTH

(Concluded from page 20)

There still remains, of course, the basic problem as to what are optimum classroom lighting requirements. Recently the American Council on Education in Washington has set up as one of its standing committees, the Committee on School Plant Research. One of the Problems to which this committee has been giving consideration is that of lighting. The committee has proposed the erection of a school building of semiportable type equipped with movable desks, blackboards, and furnishings, and so constructed that it can be rolled on a circular track thus providing for any compass orientation or fenestration. Unfortunately, thus far the committee has been unable to secure the funds necessary for carrying on this experiment. It does seem clear, however, that extensive research is badly needed in this important aspect of school-building construction.

Other aspects of construction which have health implications are toilets, washbowls, drinking fountains, and other sanitary provisions. That adequate provision of these sanitary facilities is important seems evident. The problem, however, is to determine what is an adequate supply. During the past two years the committee just referred to has carried on a nation-wide study on the use of toilet facilities and washbowls in public schools. From this study, which is soon to be printed, it seems clear that the present requirements are far in excess of the actual need. Most states have definite requirements for these facilities in relation to the school enrollment. These requirements, however, are based on judgment rather than objective evidence. It is our hope, therefore, that this study will throw new light on what constitutes adequate toilet and washbowl facilities in public schools.

Equipment for Safety

In so far as health is concerned, the important aspect of equipment is that of safety. From the figures earlier cited, it will be recalled that one of the most frequent causes of accidents was the handling of apparatus or machinery in the building. As a result of these analyses of causes of school accidents, most states now require either by law or by regulation that all power machinery be adequately protected. For example, in some states the requirement is that a pupil may not use power machinery except in the presence of the teacher. Manufacturers also have cooperated in greatly reducing the hazards resulting from the use of power machinery.

Seating is another item of equipment which undoubtedly has health implications. Pupils seated in seats so high their feet will not touch the floor, or with desks so high and so far away that they must both raise their arms and lean far forward are certainly not in a situation conducive of health. In a study of seating in the Charleston, W. Va., schools it was found that more than 50 per cent of the 10,524 pupils were in seats too high for them, while the desks were reported too high for 87 per cent of the elementary pupils. In a current health and physical education study which we are now making, careful observations have been made of the seating of 20,427 pupils. Four different observations were made on each of these seats as follows: height of seat from floor, width of the seat, the distance from the back of the seat to the desk, and the height of the top of the desk from the floor. On the basis of these criteria there were found 12,305 maladjustments in seating. It is my judgment from other observations that the figures given are fairly typical of the seating conditions in the public schools. Just what the health implications of these are I am unable to say, but undoubtedly a child comfortably seated will be better both from the health and learning angles than one not so seated.

Another health hazard in the field of equipment is found in chemical laboratories. Much progress has been made in providing proper fume hoods for these, as well as improving the general safety in these laboratories. As a result of these efforts, accidents in chemical laboratories are becoming less frequent.

Another equipment field in which rapid progress has been made is that of pupil transportation, which has now become a huge enterprise as shown by the fact that in 1938, 3,388,645 children were transported by bus at an annual cost of slightly more than $66,000,000.[18] With so large a number of children, the problem of safety is highly important. Already most states have developed standards for buses and their operation, while in 1939 there was approved by representatives of the 48 State Education Departments a national set of minimum standards.[19] Therefore rapid headway is being made in this new field to protect these children.

It is quite conceivable that a school building might be equipped with the most modern provisions for heating, ventilation, lighting, and sanitation, and yet be wholly unsuited for pupil use because of poor operation. For example, the building might be provided with fans for the circulation of air and yet these fans be turned off. Likewise, the light intensities can be greatly reduced by allowing dirt to accumulate on the fixtures. It follows, therefore, that the field of operation is most important. A common mistake which boards of education make is to erect a new school building with all modern provisions for health and then engage as janitor a person who has had no experience whatever in the operation of such facilities. I recall a case where this happened and as a result, three heating plants were burned out in a five-year period. Needless to say, when a community invests large sums of money to provide adequate accommodations for its children, it must provide alert, intelligent, and well-trained personnel to operate that school plant. To that end, the universities of California, Purdue, Texas, and Wisconsin, and Iowa State College, and Michigan State College now offer short courses for janitors. Also a number of the large cities offer training courses for their custodial staff. Therefore it is hoped that bright young men willing to make this a lifework, can be drawn into the janitorial field.

[18] M. C. S. Noble, Jr., *Pupil Transportation in the United States*, International Textbook Co., 1940, p. VIII.
[19] *Ibid.*, pp. 279–314.

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BUILDING FOR THE SMALL ELEMENTARY SCHOOL

(Concluded from page 18)

kitchenette for community-room uses. The room marked "storage" across the corridor from the stage is a costume and property storage room, the classrooms themselves serving as dressing rooms.

The school is designed with terraces opening out from each classroom for outdoor activities. The classrooms are each 40 by 23 ft.

Cost a Determining Factor

Most of the answers to the problems of the small school will depend upon the amount of money available and the cost per unit. As a general policy it is not to be expected that the cost per pupil can greatly exceed the average for other schools of the district. What this average would be, naturally depends on the location, type of construction, and the price of materials and labor at a given time. In Los Angeles over a period of years, the cost of construction of elementary schools as estimated in terms of the capacity of the school has been from $250 to $300 per pupil. It has been found possible to build a complete elementary school with a capacity of 300 students at approximately this price. Obviously, if this is to be accomplished, there must be economies in the type of construction and in limiting the general facilities to the actual needs of the school.

In erecting the buildings at Gravois Avenue and the Ivanhoe School, an attempt was made to find a type of construction suited to the needs of the small school which would combine durability and good appearance with low unit costs. This was accomplished by combining wood frame and stucco construction with very durable materials for floors and roof. The floors are of concrete resting directly on the ground with a layer of sand to break capillarity. The floor coverings are mastic tile which have proved better in some ways than other floor materials in more expensive buildings. The roofs are of thin sheet copper strips applied over wood in such a way as to produce the effects of shingles. The general effect is one of beauty and permanence, but the cost per student is not in excess of the average of larger plants.

THE DEVELOPMENT OF PUBLIC SCHOOL GROUNDS

(Concluded from page 29)

in connection with and adjacent to the service drive. Both units should be fenced off or located so that it is impossible for vehicles to drive upon the playgrounds, lawns, or sidewalks used by the children.

It is also essential to plan so that the children are not obliged to go through the parking grounds or to cross the service drive in going to or from classes in the building to the playground.

In connection with service areas, provision must be made for storing and disposing refuse materials. Where coal is used for heating the buildings, there are large quantities of ashes and cinders which must be removed immediately when taken from the boiler pits or stored until the time when they can be removed. Schools which maintain lunchroom and domestic-science classes have other types of refuse, such as tin cans, cartons, and garbage. If an incinerator is not a part of the school plant, concrete receptacles should be provided and placed so that they are readily accessible to the school staff and to the crews of the refuse trucks to empty and clean. Too often some recessed corner of the building is used for a rubbish pile, and invariably the material which becomes wisely scattered is a source of annoyance to all concerned.

Facilities of public utility companies serving the school are often unsightly and are real hazards. For example, poles carrying electric-light or telephone wires should never be allowed on play areas. So-called "dead men" or short poles which serve as anchorages for utility wires adjacent to or on playgrounds are bound to be sources of annoyance and accidents. This type of service should be taken to the school through underground conduits. In the main, no one section or unit of the school grounds should be planned and developed individually. Only by taking into consideration all of the various units and considering each one, not by itself, but in relation to the whole, can the area surrounding a school be successfully and efficiently developed.

The most successful development will be that one which, when completed, will give the effect of unity and will not appear to be a series of small units artificially grouped. To secure this result and even before the purchase of the site, and the erection of the building, the entire school plant should be thoroughly studied and facilities within and without the building closely co-ordinated.

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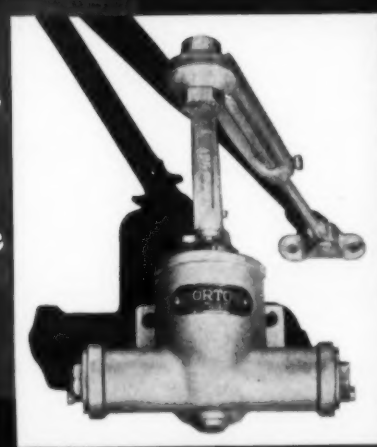

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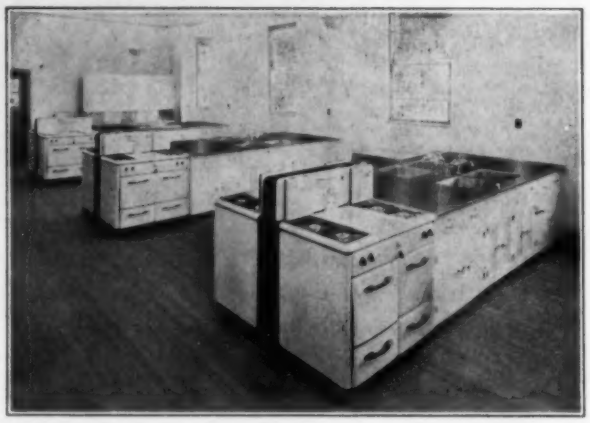

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BUILT TO TRAIN FOR LOCAL INDUSTRY

(Concluded from page 26)

30 ft. and ranging from 54 to 100 ft. in length. In addition, extra space is provided in each shop for a group of rooms consisting of the instructor's office, toolroom, and the mezzanine storage room overhead. All of these shops are equipped with the latest and modern types of machines and accessories.

Nonshop Facilities

The classrooms are standardized in size at 22 by 32 ft., with the science rooms varying in length from 40 to 45 ft. All classrooms have plastered walls and metal picture molding, and are equipped with slate blackboards. The visual-education room accommodates 64 students with its tiered arrangement of folding-arm auditorium type seats. The trade-theory room as well as the science classrooms and visual-education rooms are also equipped with laboratory demonstration desks to permit demonstrations by the instructors. The science laboratory is modernly equipped and adequately supplied, making it possible for students to perform their own experiments.

The administrative suite consists of the general office, the office of the principal, the office of the director of vocational education, and a medical room. The general office is equipped for secretarial work and is arranged for the reception of visitors. The control units of the central address system are located in the principal's office.

The auditorium, in the western wing, provides an adequate stage for school and play purposes. It will accommodate about 640 people. The stage is equipped with a modern switchboard which has dimmers for all regular lights, as well as for a four-color lighting scheme with accompanying pin spotlights. The stage curtain of blue and gold, with the cyclorama in a neutral gray, presents a pleasing and restful atmosphere for the audience. The lobby of the auditorium has separate men's and women's toilets so that this unit can be used independently of the rest of the buildings. A ramp leads down from the main corridor to the stage entrance and the orchestra area. The auditorium has an acoustic plaster ceiling, plastered walls, and cement dados.

Complete Communication System Installed

From the central address units in the principal's office runs a network of wires to operate a complete public-address communication system throughout the building.

Two separate programs can be broadcast to two sets of rooms at the same time. If desirable, a communication by microphone may be had with any one room. The system also makes possible a two-way conversation between room and office, without disturbance to the program being sent out through another channel. Portable sound projectors are used in the visual-education room and in the auditorium.

The gymnasium on the eastern angled wing is 150 ft. long, 100 ft. wide, and 37 ft. high. Directly beneath the gymnasium are two complete sets of locker, shower, and drying rooms for home and visiting athletic contestants. The gymnasium has hardwood floors and is equipped on the two long sides with telescopic type seats which seat approximately 2000 in the 16 eleven-row bleacher sections. When used for regular gymnasium classes the main court is divided crosswise into four standard basketball courts.

Heating and Ventilation

The building is served by three boilers with automatic stokers. A tram rail carries fuel and ashes. All classrooms are equipped with unit ventilators. Plenum fans are provided for the auditorium and the gymnasium. The unit ventilators in the shops, the cafeteria and kitchen, etc., are further helped by positive exhaust ventilating fans. In the shops where dust and gases are produced overhead air supplies are provided.

The McKeesport Vocational School was completed in September, 1940, at a total cost including land, building, and equipment of approximately $1,200,000.

A SCHOOL BUILDING PROGRAM IN A GROWING CITY

(Concluded from page 23)

mentary schools for their interschool games. When the new stadium is completed it will be probably one of the best physical-education plants in this part of the country.

The above is a brief description of the Ottumwa building program as far as it has been worked out. The people of the community have displayed a tremendous interest in their schools. The per pupil teacher load is better balanced than it has ever been in the past. Even in the older buildings much better work is being accomplished because the three new schools have relieved the overcrowded conditions. It is certain that throughout the entire system much more efficient work will be done because of the new buildings that have been built.

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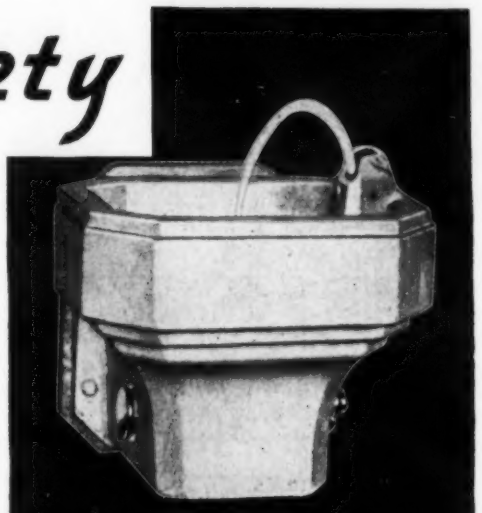

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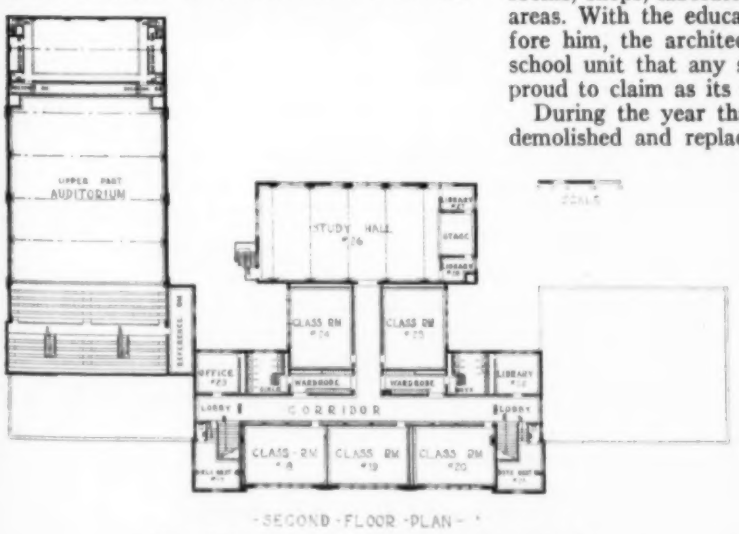
THE NEW CENTRAL SCHOOL, WHITEFISH, MONTANA

(Concluded from page 50)

The high school enrollment had reached almost 400

The rapid growth of the student population necessitated expansion, but until WPA grants were made available no extensive building program could be attempted. Finally, in 1936 with the help of the government grant the old gymnasium was torn down and replaced by the first wing of the new building, providing a new auditorium and 9 classrooms.

A year later the school district suffered a heavy blow. An earthquake tremor, followed by a severe, cold winter did extensive damage to the original central school structure. After the spring thaw the brick walls bulged as much as 6 in. Timber had to be used to support the awls. After the building had been reinforced, an engineer, called from Spokane to make an inspection, was forced to condemn it. Had this damage occurred before the high school wing was built, separate grade and high school buildings no doubt would have been erected in different locations.



Whitefish School, Whitefish, Montana.

The school board then consulted Mr. Fred Brinkman, the architect, who planned the high school wing. The superintendent was authorized to outline the educational community-center needs of the district and to provide the architect with a schedule of the desired classrooms, shops, laboratories, and other teaching areas. With the educational requirements before him, the architect drew up plans for a school unit that any school system would be proud to claim as its own.

During the year that the old building was demolished and replaced by the new central wings, school was conducted in four old railway passenger coaches, using a threshing engine to furnish steam to heat them.

The new building houses about one thousand pupils in grades one to twelve. The gymnasium and athletic field are located across the street. This street is closed during the school day so that pupils may pass freely and without danger.

Whitefish has succeeded in providing an excellent school plant, a usable gymnasium, and an athletic field for its youth. The entire school plant is dignified, effective, and economical, and is contributing to the growth of the school in the social and educational service of the community.

Construction and Equipment Details

Roof construction and materials, Asbestos built-up roof, Johns-Manville.
Insulation ceilings, Celotex tile.
Floors, auditorium, gymnasium, maple.
Unit ventilators, "Temperators," C. A. Dunham Co.
Unit heaters, type "M," Dunham Co.
Lighting, semi-indirect, Westinghouse and General Electric.
Program clocks, International Time.
Radio and broadcasting system, RCA.
Flush valves and shower mixing valves, Sloan.
Blackboards, slate.
Administration equipment, typewriters, adding machines, Underwood.
Mimeograph, A. B. Dick Co.
Furniture, tablet-arm chairs; teachers' desks, folding chairs; auditorium seating, American Seating Co.
Laboratory furniture, Kewaunee Mfg. Co.
Shop Equipment, Walker-Turner Co., Porter-Cable Machine Co.

SCHOOL-BUILDING CONSTRUCTION

During the month of November, 1941, contracts for new school buildings in 11 states west of the Rocky Mountains were let for 4 buildings, to cost $537,635. Eleven projects were reported in preliminary stages, to cost $629,015.

During the first 11 months of 1941, a total of 271 contracts were let, at a total cost of $13,795,742.

Dodge reports contracts let in 37 eastern states for 181 educational buildings, at a cost of $7,307,000.

SCHOOL-BOND SALES

During the month of November, school bonds in the amount of $4,496,000 were sold. The average interest rate was 2.75 per cent.

During the same month, short-term and refunding bonds were sold, in the amount of $2,323,537.

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New Books

Unit Costs of School Buildings

By Henry H. Bormann. Cloth, 83 pages. Price, $1.60. Bureau of Publications, Teachers College, Columbia University, New York, N. Y.

This study has for its purpose the evaluation of nine commonly used measures of building size or capacity and units of cost. It attempts to answer the following questions: "(1) What are the advantages and disadvantages of the various units applied to school-building costs? (2) Which measure of building size or capacity is best suited for use in estimating the cost of a proposed building? (3) Which unit of cost is best suited for comparing school-building costs? (4) Can a new unit be developed which will be more satisfactory than those now used?"

The following conclusions are reached: "Total cubature is the best measure of building size or capacity to use for estimating the cost of a proposed school building. Such an estimate should be based on known costs of similar buildings. Cost per cubic foot is an unsatisfactory unit of cost to use for comparing school-building costs.

"Cost per cubic foot of habitable cubature is the best unit to use for comparing costs in terms of efficiency of designing and planning.

"Cost per cubic foot of educational cubature, cost per square foot of educational floor area, and cost per weighted pupil station are the best units to use for comparing school-building costs in terms of educational serviceability."

The author concludes that his study shows the folly of continuing to make comparisons on the basis of the cost per cubic foot. School-building costs should be compared in terms of several pertinent units of cost. These more desirable units are the only means of revealing the differences in cost in relation to efficiency of designing and planning, and in relation to the educational serviceability of school buildings. The cost data on many buildings, if readily available, would enable architects and educators to utilize a broad background of comparable experience in judging the preliminary plans of proposed buildings.

In planning new buildings, it is highly desirable to decide whether the cost will be relatively high or low, as compared with similar buildings; what the underlying causes of these variations in cost may be; and whether the cost can be justified from the standpoint of the quality of construction and of potential usefulness. The purpose should be not so much a reduction in the total number of dollars spent, as the greatest possible return for each dollar in terms of ultimate utility and true economy.

A Handbook for the School-Board Member

By Harlin L. Hagman. Cloth, 151 pages. The School Activities Publishing Co., Topeka, Kans.

This is a useful book. It is well arranged, compact, yet inclusive. The prestige, dignity, and import of school-board service is aptly exemplified.

The text is based on the question-and-answer plan. The questions are those most likely to be propounded by the citizen who has accepted a school-administrative task and who seeks an illuminating answer. They cover the entire range of the school-administrative service.

The first chapter, for instance, asks such questions as. "Why should the board member make some study of his job?" "What should be the chief interest of the board member upon taking office?" "What personal qualities are desirable in a board member?"

The author not only discusses the individual member but also the board in its collective capacity. The meetings, procedure, policies, and projects are fully dealt with. A chapter is devoted to the office of the secretary, his importance as an executive, his duties, the records he must keep, and the general duties assigned.

Likewise, the scope, function, and operation of the superintendent's office are well discussed. Here the author, too, points out what are the qualifications which must be looked for in a competent school administrator. The interrelation between board and superintendent are defined in the light of the experience of the past four decades and the now widely accepted conclusions on the subject.

The final chapter on the Educational Program suffers from oversimplification and brevity. Behavior of children cannot be dismissed without some reference to aspects of heredity and of free will. Health education is of greater importance in a balanced school program than athletics. Similar important problems are dismissed with too great brevity.

Ready to Read

A pupil's workbook. By Donald D. Durrell and Helen B. Sullivan. Paper, 64 pages. Price, 28 cents. World Book Co., Yonkers-on-Hudson, N. Y.

This workbook is planned to rapidly develop auditory and visual discrimination in beginners. Each of the lessons is based upon extended research and has been found effective in progressively tying sounds and visual forms of words to the point where the child is ready to, and does begin to, read.

Spanish Colonial Furniture

By A. D. Williams. Cloth, 136 pages. Price, $3. Bruce Publishing Co., Milwaukee, Wis.

The book is a result of years of study of Spanish American colonial furniture as it was developed in the territory now included in the states of Texas, Arizona, and New Mexico. Designs and directions for making 57 pieces which are adaptations of Spanish models are given. A remarkably different type of furniture reminiscent of early American culture, it will give satisfaction in making, and enjoyment in use.

Record Keeping for Everyone

By W. L. Moore, H. E. Wheland, and C. M. File. Cloth, vii–433 pages. Price, $1.60. South-Western Publishing Co., Cincinnati, Ohio.

This one-year course in personal and small-business accounting is addressed to the high school student who is not likely to become a bookkeeper.

Bobby Dog and His Friends

By Helen D. Hunt. Cloth, 96 pages. American Book Company, New York, N. Y.

The happy story of Dan and Betty and their pets, Bobby Dog, Just-a-Cat, and Pink Ears Rabbit. The vocabulary embraces 186 words of first-grade difficulty.

Functions of Business

A textbook for consumer and producer. By Lloyd L. Jones, Herbert A. Tonne, and Ray G. Price. Cloth, 562 pages. Price, $1.50. The Gregg Publishing Co., New York, N. Y.

The authors of this book approach their subject in a practical way and enter intimately into business as exemplified in this country today. They not only distinguish between the producer and the consumer but deal intelligently with all of the phases of distribution. They hold that after all, commerce, trade, and finance control that routine of distribution which aims to bring the products of farm and factory to the ultimate consumer.

The book is divided into 7 parts and 21 chapters. After an illuminating introduction, which touches briefly upon the beginnings of business, the several historic periods and its present complex proportions, the text delves into the function of marketing, creating consumer demand, and the art of selling.

Space is given to organization in business, ownership, and control. Then the attention of the student is directed to budgeting control and accounting, credit, banking and financing. Here the text becomes most inclusive and instructive. The student is familiarized with basic essentials and is given a clear perspective of the true function of business.

The text is liberally sprinkled with suggestive illustrations. A fulsome appendix is provided, as well as a helpful index.

The Nature and Use of Reading Tests

By Arthur E. Traxler. Paper, 64 pages. Published by the Educational Records Bureau, 437 West 59 St., New York, N. Y.

The author maintains that far too few teachers give adequate attention to the reading problem, especially at the high school and college levels. Very few high school students, he maintains, are excellent readers, and from 10 to 25 per cent of them are handicapped to such an extent that they cannot do efficient schoolwork.

The present study attempts to carry out the recommendations of the subcommittee on reading tests of the Educational Records Bureau. It discusses the problems of reading diagnosis and the availability of instruments for diagnostic work of this kind. A section contains a description and analysis of current reading tests,, and a list of the materials available for use in remedial corrective, and developmental reading.

Economic Trends Affecting Public Schools and Teachers

Bulletin No. 2, Nov. 15, 1941. Published by the New York Teachers' Association, Albany, N. Y.

A report on a study of economic trends, including wages, salaries, and other kinds of income. The report predicts a continued drop in the number of youths preparing for teaching, an eventual shortage of well-qualified and well-prepared teachers to fill vacancies, and a demand for adjustments in minimum salaries and salary schedules, particularly in the rural school districts of the state.

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A classified listing of products regularly used in school construction, maintenance, and operation, is published below, as a convenient guide to sources of supply. Manufacturers of products advertised in the AMERICAN SCHOOL BOARD JOURNAL are listed under their product headings. For the page number, on which their advertising appears in this issue, refer to the index to advertisements, page 87. On products not now advertised in the AMERICAN SCHOOL BOARD JOURNAL, use our Subscriber's Service bureau, for reliable sources of supply Complete details on page 88.

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Hunt Pen Co., C. Howard
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Bausch & Lomb Optical Co.
Bell & Howell Co.
Da-Lite Screen Co., Inc.
Holmes Projector Co.
RCA Mfg Co., Inc.
180 PUBLIC ADDRESS SYSTEMS
Holtzer-Cabot Electric Co.
International Business Mach. Corp.
RCA Mfg. Co.
181 PUBLISHERS
Bruce Publishing Co.
G. & C. Merriam Co.
RCA Mfg. Co., Inc.
182 RADIATORS
Crane Co.
183 RADIATOR VALVES & TRAPS
Crane Co.
184 RADIOS
Holtzer-Cabot Electric Co.
R.C.A. Mfg. Co., Inc.
185 RANGES, ELECTRIC
Pick Co., Albert
186 RANGES, GAS
187 RECORDS (VISIBLE)
188 RECORDING EQUIPMENT SOUND
R.C.A. Mfg. Co., Inc.
189 REFRIGERATORS
190 ROLLERS, WINDOW SHADE
Draper Shade Co., Luther O.
191 ROOFING
Celotex Corp.
192 RURAL SCHOOL EQUIPMENT
Beckley-Cardy Co.
193 SANDING MACHINES
Skilsaw, Inc.
Tennant Co., G. H.
194 SAWS, ELECTRIC
Skilsaw, Inc.
195 SCALES
196 SCIENTIFIC APPARATUS
Bausch & Lomb Optical Co.
Kewaunee Mfg. Co.
Standard Electric Time Co., The
197 SCORE BOARDS, ELECTRIC
198 SCOTCH TAPE
199 SCREENS, WIRE WINDOW
200 SEWING MACHINES
201 SHOP EQUIPMENT
Delta Mfg. Co.
Yates-American Machine Co.
201-1 SHOWERS
Crane Co.
202 SIGNAL SYSTEMS
Holtzer-Cabot Electric Co.
International Business Mach. Corp.
Standard Electric Time Co., The
203 SLATE BLACKBOARD
Natural Slate Blackboard Co.
204 SLATE STRUCTURAL
205 SOUND DEADENING MATERIALS
Armstrong Cork Co.
Celotex Corporation
Wood Conversion Co.

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After The Meeting

SCHOOL OFFICIAL RESORTS TO RHYME

John W. Brooker, State Superintendent of Public Instruction of Kentucky, has a sense of humor, together with a philosophic mind. When subjected recently to criticism by a city schoolboard member, he replied by quoting James Whitcomb Riley, as follows:

"It doesn't pay to say too much,
When you're mad enough to choke,
For the word that stings the deepest,
Is the word that's never spoke.

"Let the other fellow wrangle,
Till the storm has blown away,
Then he'll do a heap of thinking
'Bout the things you didn't say."

Sympathy Expressed!

Teacher — Will those who know nothing whatsoever of this subject kindly stand?

After a slight pause one student rose to his feet.

Teacher (grimly) — So you know nothing, eh?

Student — It's not quite as bad as that, sir, but I hated to see you standing there alone. — *Exchange.*

Awake! Awake!

Mr. John Lewis, of Baltimore, tells the story of a college professor, who dreamed that he was in class lecturing to his students. Then he awoke to find that he was.

With Castanets

The 11-year-old editor of his school paper was asked to give a talk at a recent meeting of the Elementary Press Association of Chicago. Later his father, who had not heard the speech, asked the boy to repeat it for the family exactly as he had given it before the press association. "You mean with my knees shaking and all?" asked the lad. — *Chicago Tribune.*

Longer and Quicker

The school communal dinner was in progress. Said the teacher in charge: "Don't reach across the table like that, Johnny. Haven't you got a tongue?"

"Yes, miss," replied Johnny, "but my arm's longer."

School Buyers' News

Issue Booklet on Industrial Control Devices

The Brown Instrument Co., Philadelphia, Pa., a division of the Minneapolis-Honeywell Regulator Co., has issued a new catalog No. 8301 entitled, "Industrial Control Devices."

This 56-page, 2-color catalog is a comprehensive source of information to all those interested in learning how production can be increased, how costs can be lowered, and how production quality can be improved through the use of automatic control devices.

The booklet, which is useful for the engineer and layman, constitutes a primer of automatic control. It takes up the three classes of automatic control — electric, pneumatic, and combined electric and pneumatic. It includes photographs illustrating 44 major types of industrial controls and safeguards, together with complete specifications and information details of capacities, construction, and operation.

A copy of the catalog is available upon request.

Bradley Washfountains Eliminate Congestion

The Bradley Washfountain, manufactured by the Bradley Washfountain Co., Milwaukee, Wis., has proved popular and successful.

The new 36-in. diameter washfountain can be used by as many as six children at one time. In the Mastick School, in Alameda, Calif., traffic

A circular washfountain develops habits of cleanliness at a minimum expenditure for soap, water, and washroom fixtures.

has been speeded up by the installation of this fixture.

Installation costs are low because the Bradley equipment uses the same plumbing connections a single-person unit does. There are hand- and foot-controlled models, both in the circular and semicircular types. The standard equipment includes cake soap tray, mixing valve, and trap. These fountains are self-cleaning and cut down janitorial work. Children wash with running water but the water is conserved because there are fewer pipes and valves.

New Magic Chef "Add-a-Units"

The American Stove Co., Cleveland, Ohio, has announced two new additions to the famous Magic Chef line of heavy-duty gas cooking equipment. These new models of the "Add-a-Units" have been designed for use as auxiliary equipment to batteries already in operation; they may be installed separately or in any number to suit special requirements.

Magic Chef Add-A-Unit ranges are adjustable to every school cafeteria requirement.

Four models in two styles are offered — two fry-top and two grate-top units, for use with 35-in. deep ranges, and 42-in. deep ranges. Single- or double-deck elevated shelves are available for use with all models of "Add-a-Units" and may be obtained separately.

All models have concealed manifold and gas cocks; coved back top for easy cleaning; concealed bolts; and roomy storage compartment with sturdy door on concealed hinges. Efficient flat grates permit sliding of pots and pans without tipping; two separate circular grates permit self draining to drip pan. A convenient top burner lighter is supplied.

Complete information is available upon request.

RCA Electron Microscope

The RCA Manufacturing Co., Inc., of Camden, N. J., has announced its RCA electron microscope, which is making interesting contributions to the store of scientific knowledge. The microscope, devised by Dr. James Hillier of the RCA laboratories, has magnificent power up to 100,000 diameters, which is from 50 to 100 times more powerful than the strongest optical microscope. Scientists predict that the instrument will open whole new worlds to research experts, particularly in bacteriology, metallurgy, etc.

Using electrons, infinitesimal bits of electricity, instead of rays of light, and magnetic or electrostatic fields instead of glass lenses, the electron microscope enables man's eye to peer deeply into submicroscopic realms. Industrially, the instrument is being used in national defense in a number of important research laboratories and has been installed in the United States Bureau of Standards.

Offer Defense Training Films

The Bell & Howell Co., 1801 Larchmont Ave., Chicago, Ill., has issued the first of a series of more than 50 machinist and industrial training films, which have been prepared under the direction of the U. S. Office of Education.

The present film, "Cutting a Spur Gear" will be followed by other films, to be prepared under instructor guidance for more intensive training.

It is expected that 18 different subjects, each occupying from 10 to 30 minutes, will shortly be available. The pictures can be run on any 16mm. sound projector.

Changes in Crayon Products

The American Crayon Co., Sandusky, Ohio, has announced that such changes as may be necessary in their products due to wartime priorities and allocations, will from time to time be made. We quote as follows "With priorities on certain war materials, and with the desire to cooperate fully with our government in the defense program, we may in some instances be forced to deviate from our standard in colors or quantity."

A return to 100 per cent standards, if any changes are made, will follow as soon as the "emergency" has passed.

New Ink Bottle

The illustration shown depicts the repackaging of Higgins Engrossing Ink from a 1½-oz. round bottle to a 2-oz. cube bottle with broad, flat cap. Suggested uses and simplified directions are printed in as few words as possible on both

cap and label. The remerchandising of Higgins Engrossing Ink is another step in the policy of modernizing their complete line of drawing inks, writing inks, adhesives, and sealing wax, which Higgins Ink Co., Inc., 271 Ninth St., Brooklyn, N. Y., has. The cube bottles by Hazel Atlas with caps from National Seal may be easily stacked.